DEVELOPMENT OF A USE-FORM GROWTH METHOD FOR THE PEOPLE OF POLAROID AND CAMBRIDGE

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Development policies in a thriving urban area are the subjects of this study. The study involves a brief evaluation of current planning policies and a development proposal based on a better method of organizing physical growth such that more members of a geographical community will benefit from that growth. The East Cambridge area of Metropolitan Boston will be used as a case study. (Figure 1) The evaluation and development proposal may be tested according to specific characteristics of this area and applicable generalities extended from this context. (Figure 2)

Several kinds of forces are prompting growth in East Cambridge. (Figure 3)

1) The differentiation and expansion of research and study at M.I.T. involves the physical expansion of the Institute as well as the related pressures created by increasing numbers of staff and students.

2) Companies have been formed which specialize in the development of various inventions and discoveries made at M.I.T. and local research-oriented companies.

3) Large corporations which have been in Cambridge for a long period of time are continuously expanding into the community. The Badger Company is presently constructing

an office tower and shopping center in Kendall Square. The Polaroid Corporation occupies parts of eleven buildings in Cambridge. Although a research corporation by definition, Polaroid has diversified interests ranging from the manufacture of plastic identification tags to lenses for sunglasses. Recent consumer oriented innovations such as "The Swinger" and "Color Pack II" cameras are examples of developments which have caused its space needs to increase sharply. As a result, planners at Polaroid project that the corporation will need to double its size in Cambridge within the next ten years.

4) Technology Square is a development offering general office space for varied business activities. Two more buildings have been planned for future construction on the site.

5) N.A.S.A., a governmental agency, is presently building an extensive Electronics Research Center adjacent to Kendall Square.

6) The "Triangle" between Main Street and Broadway and from Kendall Square to the railroad is an urban renewal package made available for development by the Cambridge Redevelopment Authority. The "Triangle" is intended for housing, commercial, and office

rental and is offered to interested developers who would build for those uses.

7) Each new large size development that occurs in East Cambridge represents a vote of confidence in that planning method for this area and the demands for land grow as a result.

8) Cambridge has received a Model Cities grant from the Federal Government, and the "site" for the Program is adjacent to much of the property described earlier.

9) All of the proposed routings of the Inner Belt Highway cut through East Cambridge in such a way that real political struggles are continuing to influence the positioning of that Highway--if there is to be a highway at all.

It becomes clear that large institutions or industries are jockeying for available space in a fast growing area. Given the past and present experience in East Cambridge, the future of this community is not too difficult to predict. The form which East Cambridge will take depends upon:

1) The needs of the institutions and corporations described above and the resultant effect of managerial policies to accommodate those needs within the community

2) Planning policies established and enforced by the Cambridge Zoning and Planning agencies for the physical development of that

area

3) The reaction of the existing population to change by growth and the possible self-initiated action of the residential community in the future.

The proposal to be made later will place emphasis on provisions for industrial urban growth which will fulfill the needs of an industry and a community, and the accommodation of these needs will be as nearly as possible mutually supporting. Such a method would permit institutional and industrial growth while minimizing its negative effects, and actually creating positive effects as a result of that growth.

The benefits to East Cambridge from this influx of industry could be extensive. A stronger tax base will result from developments such as the Badger Building Complex, Tech Square, and the "Triangle", as well as the taxes paid by the smaller companies mentioned which are more evenly dispersed in the city fabric; however, M.I.T. makes payments in lieu of taxes which are considerably less than the normal tax rates would demand and N.A.S.A. will be paying no property taxes at all! New jobs will certainly be created, but the kind of jobs which are needed for the residents of Cambridge are not likely to occur as a result of this very technical and research oriented growth unless extensive job-training programs to train semi-skilled workers are initiated. A further analysis

of the total range of accrued benefits which a community receives, as well as an analysis of which members of the community receive them and which do not is a necessary step in any economic, social, or legal investigation; however, that kind of detailed examination is not the intent of this study, although certain general conclusions regarding the distribution of benefits are obvious.

The most noticeable side effects from industrial presence in a community are also socio-economic. Land acquisition and escalation of land values with accompanying tax increases are a very real danger to persons who have been living in a community for some time. The influence of a corporation's tax-paying ability (or payments in lieu of taxes!) on city government decisions is hardly a match for the home or shop owners vote at the polls. Although this study is to be centered upon physical development policies of urban growth rather than economic analyses of that growth, the inferences to economics are always present as a result of built decisions made by corporations and individuals. Built decisions refer to decisions made about the kind of uses intended for a development and the kind of building or built-form which is constructed to accommodate those uses. This report will analyze the uses and forms of physical growth through the study of existing built examples. The policies which have promoted these developments will be determined and analyzed, and a proposal for an alternative method of development will be offered. The new policies which would be needed to control,

define, and encourage the proposed method of development need to be carefully determined and tested by analogies and controlled application; however, the range of policies intended will be suggested in the summary of this study.

Besides the economic phenomena which are known to accompany a decreasing amount of available land in a high demand area zoned for commercial and industrial uses, it is also possible to predict the sort of physical growth that will occur in that area based upon existing general historical examples:

1) The largest possible individual sites or directly connected sites are assembled, so that the owner can control his physical growth in the future. (Often sites are acquired which are presently zoned for a use such as housing, because the owner can acquire them at a cheaper rate, pay residential taxes, and eventually get the zoning changed to permit other, more profitable uses.)

2) Entire buildings are then built on the assembled site and growth normally occurs by the addition of more, complete buildings to fulfill some earlier pre-determined Master Plan made only for that site.

This has been the pattern of development in the majority of cases as a result of development policies such as Land-Use Laws, Floor Area Ratio requirements, Building Set-Back requirements, and urban-renewal parcelling methods.

Technology Square follows this pattern quite closely. The 1957 Cambridge land-use map showed that 75% of this land was zoned for multiple-family residency, single-family residency, and small businesses, and that 25% was zoned for light industry. The most recent land-use map shows the Tech Square site zoned exclusively for industrial purposes with no height restrictions or street set-backs. The principal zoning requirements are that the buildings maintain a certain distance apart and a Floor Area Ratio of 4.0. (Figure 4)

These planning policies have allowed the kind of predictable growth which Tech Square represents, and would have prohibited the kind of growth and change that the Montreal Central Core represents. The Montreal development is a generally continuous multi-level spine of interior many-use facilities which has allowed year-round shopping and walking ease in the heart of the Central Business District. Such mixing of uses and ownership would not have conformed to the explicit land-use laws effective in Cambridge at this time, and the pedestrian walkways which are placed above and below streets in Montreal surely would have been rejected in Cambridge. Only a few years ago planners were still arguing whether land-use divisions should occur at the center of a street or at the center of a block. If the divisions occur at the street, the change of use is reinforced by the street. For example, at Portland Street in Cambridge, the buildings of the Newtowne Court and

Washington Elms housing projects and the buildings of Tech Square glare at each other across the land-use boundary which becomes visible because of the street and accompanying set-back requirements from that street. (Figure 5) On the other hand, divisions at the center of property would force mixing of uses across a "non-public" open space on a single site and it was assumed that it was more reasonable to use the street as an edge between uses than a common shared space as the separation. It seems then, that those who build in the city and expect to have some kind of continuous, physical growth must plan that growth to occur all on one site, such that continuity of movement and structure may be achieved only within the boundaries established by the location of public streets. As a consequence, East Cambridge is being parcelled into larger and larger divisions made cellular because of the vehicular ways which become more and more pure circulation between parcels, thus the street becomes a source of discontinuity between uses and activities, rather than one of continuity among uses and users. A representation of the cuts of beef on a steer makes an interesting analogy. Although the various parts of the steer are distinguishable in terms of taste, etc., the cutting lines are only imaginary to the steer. Although streets are more real than those lines, a planning process which separates uses by streets is possibly as serious to the life of a city as a similar process is to the steer!

The Floor Area Ratio requirements, Building Set-Back

requirements, and often unlimited height restrictions have encouraged designers to make as little built committment as is possible to the land and to avoid establishing a strong relationship with public streets and sidewalks. Since open space has become synonymous with public space in land-use terminology, there are no benefits to be derived (in terms of F.A.R. requirements) from building public spaces which are sheltered and/or heated, and the distinction between public and private spaces seems to be one of all inside or all outside. Public circulation does not economically occur inside something which is built and private space which is open to the sky does not often occur. Each of these two possibilities seems to be highly desirable, but becomes an impossible trade-off given present planning policies. The Federal Housing Authority requirements contain regulations governing F.A.R.'s and building set-backs as well as minimum side yards, distance between adjacent buildings, etc. The built, inevitable result of all these minimum standards is the minimal, self-contained building and buildings represented locally by the prototypical Tech Square office group for office uses and the Washington Elms Housing Project for housing.

The Urban Renewal parcelling methods allow mixed uses, on a single,large package of land; but these uses (housing, commercial, office) are likely to be separately packaged in buildings which fulfill the requirements mentioned earlier, because there are no regulations for a

housing/commercial/office continuous building. The Urban Renewal Parcel is most attractive to a single developer, and there still is no planning method in Cambridge which allows high differentiation of use with a similar differentiation of ownership. Although such a diversified ownership may be highly desirable, a single group which could extend long-term leases will be the example used later to test a proposed urban growth method.

Two developments in East Cambridge will be briefly analyzed in terms of their projected final form as a result of building according to the present city-planning policies which have been described.

Technology Square is a development which has occurred partly as a result of the regulations described earlier. The siting of the buildings is an indication that the planners of the Square responded to those regulations by furthering the parcelling attitude. The buildings are sited around an open space which is raised only in the vicinity of the four buildings. The level change forms a pedestal which makes the grouping exclusive with relation to its surroundings. (Figure 6) The two ten-story buildings which face each other are sited such that they are definite ends to the development along Main Street while the back building is shifted to the side to allow growth in a direction perpendicular to the street, and on the side away from the Housing Projects. (Figure 3) The "pedestal effect" with buildings pushed toward the center of the site is exemplary of an attitude which makes each new development

more isolated from the street and community.

The plan for the N.A.S.A. Electronics Research Center shows that the planners have taken a similar planning arrangement determined by the tower and auditorium presently under construction and transformed it into a linear organization with a diagonal pedestrian circulation path which goes from Broadway to Binney Street. (Figure 7) The planners have even proposed a bridge across Broadway to welcome pedestrians from the projected subway stop on Main Street. Although each building remains physically distinct from other buildings on the site and none of the buildings assume the direction of the pedestrian path, the organization of the site with several low buildings, and a movement system which extends in a direction outward from the site, indicates that some kind of continuity with other parts of the community is desirable.

It has been suggested that current city planning policies are the primary causes for discontinuity among various parts of the city, and that discontinuity is reflected in site developments which have a tremendous impact upon the community in terms of the activity of people, the new services required, traffic,etc., but remain physically exclusive in terms of users and form. These developments have public space which is not public and private space made private by drawing curtains across great expanses of glass. (Figure 8) Any reaction which occurs from the existing community as a result of these developments, will surely be based to a large extent on the exclusiveness

and impact factors.

The design proposal to be offered will not be concerned with current planning regulations in the particular, but will be addressed to the goal proposed earlier of providing for industrial urban growth which will fulfill the needs of an industry and a community, and the accommodation of those needs will be as nearly mutually beneficial as is possible. It is understood, too, that the needs of urban-located industry should be reconsidered in a larger environmental sense, and that consideration is assumed for the proposal to be made.

The Polaroid Corporation has been selected as an example for this case study, because it is an industry which has both the imagination and ability to act upon reasonable proposals, and because their use requirements are compatible with the existing residential, educational, commercial, and industrial uses in the area. The growth needs of Polaroid's Cambridge operations are taken to be reasonably similar to those of other institutions: increases in employment, sizes of operations, and number of operations. The possible physical responses to those internal increases would seem to be:

1) Build new buildings on open ground.

2) Build new additions to existing buildings.

3) Rent or buy existing buildings and renovate.

A brief analysis of the attempts made by two corporations to handle these problems may suffice to show two different current physical planning methods used to accommodate this growth. Two recent examples of development for growth in Boston are the Prudential Center and Polaroid's patchwork leasing method.

The Prudential Building will be discussed only with regard to the appropriateness of its form to the growth needs of the Prudential Life Insurance Company. (Figure 9) Long-range growth may be accomplished by staging leases such that the other lessees can be replaced by Prudential employees at some time in the future. This is not a very responsible plan for non-Prudential businesses and their employees, and it is not clear that a 52-story building packed only with insurance workers is desirable either. This growth method does not allow for local additions to various departments, nor does it allow for growth past the magical number of stories which has been built. The "hat" it wears is an indication that future vertical growth was not intended. Due to the siting of buildings at the Center, it seems that growth at lower levels at some later date has not been anticipated.

Polaroid has leased or purchased space in portions of several old and new buildings in Cambridge. (Figure 10) The advantages of this method are its relatively low financial commitment at the time of leasing and the ease of moving or closing a given department of the company. This method often requires extensive renovation, does not

allow for adjacent construction growth if the property is leased, and is subject to the availability, condition, and price of additional property at any point in time.

The Prudential is an example of Master Planning with large initial financial commitments and little consideration for growth past the date when the building is "full". Polaroid's is an example of almost ad hoc planning which could possibly go on indefinitely, except that the future availability of space for lease will diminish, and relying upon the decisions of others to sell or not to sell, to lease or not to lease, will surely become problematic. Neither of these two solutions seems to really meet the growth characteristics of Polaroid. Although the Prudential Center was innovative in its air-rights planning over the Massachusetts Turnpike, other phases of its development, and especially those dealing with growth, do not represent a model to be followed. Polaroid's present method seems to represent one choice for additive growth among many.

The purpose of a proposed physical growth method is to allow Polaroid to respond to growth by choosing among the following alternatives at varying points in time:

1) Build new form on open ground.

2) Build new additions to existing buildings.

3) Rent or buy existing buildings and renovate.

A Community Plan which would allow those kinds of choices is proposed on the basis of decisions made regarding existing built form and spatial definitions, community activities

and uses, and the programmatic needs of Polaroid based upon existing owned or leased sites and projections for its growth in Cambridge. The distribution of Polaroid occupied sites occurs on both sides of Main Street from Lafayette Square to Kendall Square. The development of sites along Main Street presently allows Polaroid to be recognized as one of the members of the community which shares Main Street rather than as a company in isolation from its surroundings. (Figure 10) To promote the dispersion of buildings along Main Street would cause significant increases in local pedestrian activity, which, if commercial space is available for lease along Main Street, will create local eating and shopping places which could be of benefit to the resident community as well as the more temporary day-time community. Such demands for commercial facilities would allow more small-size business opportunities for local residents as well. Polaroid should aid this market by building space suitable for commercial leasing and they should not manage their own, exclusive cafeterias and restaurants. Since housing is in such short demand in Cambridge, one would expect Polaroid to share some of the community's burden by building housing as part of its physical development. A building method could be designed such that certain arrangements of building parts (or human use form) allowed the kinds of privacy and dimensions which are suitable for housing, and other arrangements of the same parts allowed the kind of orientation and dimensions which are suitable for other small scale operations, such as neighborhood stores

or shops. Furthermore, it is noted that a large number of employees at Polaroid live in the Boston/Cambridge area and a lesser number live in the outlying suburbs. If some apartments were built as part of Polaroid's development policy, surely many employees would choose to live there due to its urban location. The parking areas would be able to assume dual uses and produce greater efficiencies if they supported day-time and night-time use. The suggestion that Polaroid retain most of its existing space along Main Street, and to build commercial use-form and housing use-form as part of a future development is consistent with the image and goals outlined in various Polaroid publications to employees and to residents of Cambridge. Polaroid has taken pride in itself as a community within a community. Employees are encouraged to participate in Cambridge activities, and every attempt is made to allow the employee to become more involved in the company and in Cambridge.

Such an attitude is helpful in developing growth plans which will involve many parts of the community. Because Polaroid is to be a member of a community and not an isolated, self-contained entity, it follows that there could be several acceptable sites which satisfy the criterion that they be in the area defined by an association with Main Street. By working in this way, it may be seen that this plan is much different from a Master Plan which requires that each piece of property actually be controlled in order that the plan work. The sites recommended for purchase and/or development are: (Figure 11)

Site 1

The Ames Street site should be retained because of its relationship with M.I.T. developments and its direction and association with the Charles River. Local additions could occur over the parking lot, but major vertical additions may not be possible until additional loads could be transmitted to new additions.

Site 2

The group from 600 - 730 Main Street has possibilities for expansion toward the rear as well as possibilities of more upper-level connections among the buildings.

Site 3

The Osborn Street research building could be significantly enlarged vertically to permit growth for general engineering and research, and the parts closest to Main Street could be upper level connections to the 600 - 730 Main Street group.

Site 4

The Windsor Street site should be improved, but additions should be minor, and the same, management-type functions should continue. Because of the single-family residential nature of this area, the other sites in that area could be developed as housing.

Site 5

> Rights to build in parts of the Technology Square development and to extend across to the presently leased space used for Chemical Research at 750 Main Street would allow space for large size growth. Presently, state law prevents bridging Main Street in this area, but the benefits to be received by the Cambridge community as a whole in the form of additional space for building and access across a truck-travelled road might be sufficient to get a change in the law. Major growth could occur on this site without displacing families or small businesses again. (Page 8)

Each of these areas has either available land for building, or structures capable of increased loads, or both. These sites also have physical contiguity, or at least a visual relationship with Main Street. Future additions on each site would respond to local directions and conditions, but also because of the relation to Main Street, such new use-form would be identified with all of the other Polaroid sites as well as the other members of the East Cambridge community which share and use the street. To extend the example further, it is noted that Main Street-Longfellow Bridge-Cambridge Street has been the oldest and one of the two strongest ties that Cambridge has had with Boston and the Charles River. (Figure 12) To plan in such a way that the recognition of a community extends far beyond the site lines of privately owned land is a way of relating to larger

orders of organization which can tie a city into a recognizable form which is greater than the sum of its parts, but whose various parts (districts, communities, places) are sufficiently strong and recognizable within themselves so as to truly have unique characteristics. In this way, Main Street connects Government Center and Harvard Square, but each of the public and private use spaces along that street could be locally defined so that one would know that he was in a specific place along the street.

The foregoing description implies a recognition of place at a pedestrian scale rather than a highway scale. As mentioned earlier, the present trend in industrial development has been toward large, exclusive sites, and as a result, the street becomes more of a "pure" feeder with a much heavier traffic intensity than before, and with fewer cross streets to distribute the flow. The streets then become more regional than local in nature, the speeds are increased, and the ability to penetrate them by pedestrians becomes harder and harder. Such a process is not suited to urban, mixed-use growth where many spaces including streets are shared. To speak of the street as an element of continuity with two sides calls for a change in local site development. Consequently for our study purposes, a site will be selected later which permits an immediate use of the street area as a public, shared, source of urban continuity.

The Community Plan for Polaroid involves:

1) Retaining or purchasing the sites described

earlier.

2) Develop sites 1, 2, 3, by addition of new form to accommodate research and engineering growth, by a physical method for additive development to be discussed later.

3) Build form suitable for housing on lots owned in the neighborhood adjacent to Site 4.

4) Build substantial additions for research and development on the south side of Main Street, housing to the west of Tech Square, and form suitable for commercial as well as office uses across Main Street.

This Community Plan is offered for development by the implimentation of a physical use-form growth process. Use-form refers to building form suitable for a large range of general human uses; furthermore, there are certain kinds of uses which are not so different in terms of visual or acoustic privacy, and there are certain scales of dimension and enclosure which are appropriate for these similar uses. The use-forms which are to be built are not so particular as to allow only a single use; thus, the forms need not be changed in order to accommodate a certain range of changing uses. For example, although mechanical requirements may be somewhat different for light research and general office uses, a solution for interchanging the location of these uses would be to provide a mechanical system which might be locally flexible to allow for additions

to major supply sources of electrical power for lights, exhaust fans, etc., and to allow the major form to remain in place to accommodate a change in particular human use. The use-form building method which is proposed is one which will allow a great range in the size and number of physical additions because of its process of design and construction. The method requires that there be certain kinds of prefabricated and/or predetermined building parts which would be deployed during each stage of growth. By utilizing similar construction techniques and parts throughout the development of any portion of the project, the staging points become partly arbitrary and are more readily determined by immediate needs and resources than by previously timed Master Plan decisions. The Use-Form Method will allow physical change to occur much closer in time to need changes which are encountered as a result of the company's growth. The physical change and growth process is contiguous in the same way that corporate growth and change is continuous.

Planning for physical growth where the site is often the building or built-form itself involves certain commitments at the time of initial construction. Certain estimates regarding the maximum desirable height and associated weight of the structure allow plans to be made so that foundations are oversized initially to take the anticipated loads. Allowance for future mechanical rooms and ducting is also critical to growth (especially the more vertical growth); however, this is not too difficult to accomplish with zoned

systems which can occur at each major increment of growth so that reliance upon a much enlarged mechanical system at some lower level does not have to be pre-determined. Most high-rise office towers operate with intermediate mechanical floors and a smaller, less concentrated system than this would be adaptable for the Use-Form Method. Any space which is required for continuous vertical chases from the top of the built form down to the City service system can be used at an earlier date for other, perhaps less specific uses. (Figure 13) Oversizing structural members does require a certain amount of additional expense which is not as directly returnable at an early date; however, there are certain kinds of use-forms or structural parts which might be made large enough to disperse loads in a fairly even way over its area. Such structures would be wall-like forms and could serve as locations for large, bulky mechanical systems, ducting, fire-protective enclosures, acoustical barriers, etc. A more detailed description of the general kinds of parts recommended as usable forms for the growth method will be discussed later. Another comparison of economics involves the substitution of built-form as site versus a completely "new" site. (Figure 14) The availability and purchase price of land at "ground level" might be so prohibitive that overstructuring certain parts of a building to provide for future, vertical growth may be more economical in this larger sense. Less major additions could be made without as many preliminary decisions if the building method was flexible and the built-

form fitted specific uses in a loose, non-singular way. These small scale, local additions would be appropriate for enclosing certain open spaces, building intermediate levels within a high ceiling area, or building in any direction where space is available and the multiple effects are considered regarding sunlight, privacy, view, etc. These local additions and changes can occur quite easily due to the standardization of parts, geometries, and means of connection. The growth method is similar to the example of Figure 13, except that each larger addition could be built by the addition of smaller, human use-form parts.

The structural system is intended to serve other uses than merely support and bracing against calculated loads. By building the structural pieces as partial space defining elements with dimensions and form suitable for a certain range of human uses, a large portion of an infilling system is built into the structure. The parts are designed for certain orientations in terms of uses and connections such that variety and choice can be achieved in the assembly of a single part with other parts. The parts are specifically determined and designed with sufficient similarities among parts that the designed connections will allow a wide choice and subsequent substitutability of parts. (Figure 15) For example, a structural panel might be substituted for one side of a column and beam framework. There are many more complex and useful variations of this idea. The definition of space to accommodate certain ranges of use is dependent upon mutual definitions made by the

location and orientation of these partial elements in a given place; however, the sizing of parts is intended to be loosely commensurate with singular and multiple human use, furniture sizes, and structural and mechanical requirements. The designer and user may make local decisions regarding the addition and deployment of these parts in accordance with particular characteristics of that part of the "site". Such considerations involve the expression of the differences in relative height and relation to the ground, orientation and uses of adjacent buildings, pedestrian and vehicular movement, environmental factors such as light and shadow, wind direction, etc., entrances to various areas, and the servicing of those areas.

By using the parts in the manner described, the positive local characteristics are augmented and each area of built use-form becomes a particular place which is recognizable as such a unique place by the people who use it. This attitude promotes a built commitment which will allow a person to inhabit his place in a particular working/living environment, and recognize it as something individual, although it is continuous with other places which have been made with the same use-form method.

The suitability of a Use-Form Growth Method to the needs of Polaroid will be discussed by pointing to the appropriateness and desirability of such a method for the employee, the department, and the Corporation as a whole.

The system will allow the single employee a specific place to work, which is defined directly in a built way

rather than by identification systems such as names on doors or desks, color coding, etc. The construction system will allow more corner conditions or special conditions, which have always been the most desirable locations in a slab office building. The chance for more frequent change and addition allows many employees to participate in the local decision making processes about changes to their environment.

An almost constant source of newness in various areas of the building form will create the kind of on-going life within the structure which is impossible in office towers where the whole building weathers uniformly in time. Because there would be many places where small additions and changes occur, the employee would be able to understand the size of the aggregate physical organization in a more direct way by a knowledge of the additive form process which is consistent with the Corporation's growth process. If some of the dimensions found in the employee's working environment are similar to ones found in his home, an understanding of the size of his large working environment is possible through an associative, additive thinking process. If, however, his specific work space were a division of a long span layer organization which occurs in many single-use office buildings, there would not be times when he could see the entire size of his particular floor; so the larger, departmental size would never be understandable by the same additive thinking process. To summarize, a person's size in relation to his

built environment is very important and a closely similar consideration is the individual's understanding of his importance and position in a larger, organizational structure such as a corporation. If certain parallels in a built-form growth process and a corporate growth process could be made, an employee's specific place in the corporation could much more readily be seen. In addition to psychological benefits derived from the construction process, there would be other benefits for the employee, if Polaroid decided to build for housing and commercial uses as part of their development.

The system will allow the various corporate subdivisions or departments to have larger, recognizable places for their particular activity. Such places would be the equivalent of several stories in height in some places to allow for vertical spatial continuity among smaller places as well as the accommodation of future growth additions. Such an organization would avoid the hierarchical arrangement found in a more singular building where the roof level is occupied by one group, the lower, ground floors by other groups, and the majority of the occupants of the building occupy the intermediate floors with no roof-top benefits or association-with-the-ground benefits. If residential dwellings were located reasonably close to office spaces throughout the vertical height of the built form, small stores could be located nearby which could serve a limited clientele, and would not need to be near major pedestrian movement. The kind of associative identification that a

department might have with the corporation as a whole is similar to that described for the single employee.

The system will allow the Corporation to plan the magnitude and location of its physical growth in a manner much more consistent with actual growth. The image of the Corporation is the kind of place it builds for itself and its community. The image associated with the Prudential Building or the Pan American Building is the picture of an organization where total, singular form is more important than any of its local definitions. The Polaroid Corporation has the chance to build in such a way that the resultant form is the obvious sum of its parts, but that each place made by the assemblage of those parts remains unique and particular rather than subservient to the Corporation as a whole. The Use-Form Growth Process which has been proposed could allow physical additive growth which reflects a corporate structure where the singleness and dignity of the individual employee is essential to that growth.

The particular building system is shown in Figures 16, 17, 18, 19, 20 with dimensions, connection possibilities, and methods of construction described. Although five sites are suggested for development according to Polaroid Community Plan, only Site 5 will be planned to illustrate the kind of local responses possible at all of the sites by employing the use-form method to build in accordance with existing buildings, pedestrian and vehicular movement, natural orientation, etc. The appropriateness of the building system as well as the choices made regarding the

location of various kinds of built-form to satisfy the Community Plan and local conditions may be judged according to the diagrams of use and form (Figures 21 - 28) and the model built for this particular site using the building parts suggested. (Figures 29 - 33) Further development of the Use-Form Method for Polaroid would involve the design of the sub-systems of construction (Glazing, mechanical systems, etc.), and smaller scale development and coordination of those sub-systems, the major structural forms, and the particular ranges of use described in the diagrams. A staging process would then be developed to begin the growth process according to the immediacy and scale of community and corporate needs.

In this study the word "growth" has been used to explain the process by which a group or groups builds or acquires more use-form to accommodate needs--however those needs may be described. The process of growth by total site assembly in the case of Tech Square involved destroying the existing built-form, because it was thought to be unsuitable for office use. The use of the land changed from housing and commercial uses to office use. Now, if the uses should change again, what will the solution be to accommodate the new use? Will Tech Square be razed like the previous buildings? Or will it be made to adapt to housing or other uses? Since it probably will be modified to accommodate the change in use, it seems reasonable that buildings should be planned initially to

accommodate a certain range of activities and uses rather than a single use. It also seems that such a decision could become planning policy for a city, such that land-use planning might be replaced by some kind of regional use-form planning. (Figures 23 - 28) Planning policy for growth of a long-term, regional nature could then be much more responsive to existing local peculiarities of use and form. The City would be built with a stock of form suitable for changing uses, and actual differences in use would occur much more naturally than the change in use across Portland Street (Figure 5).

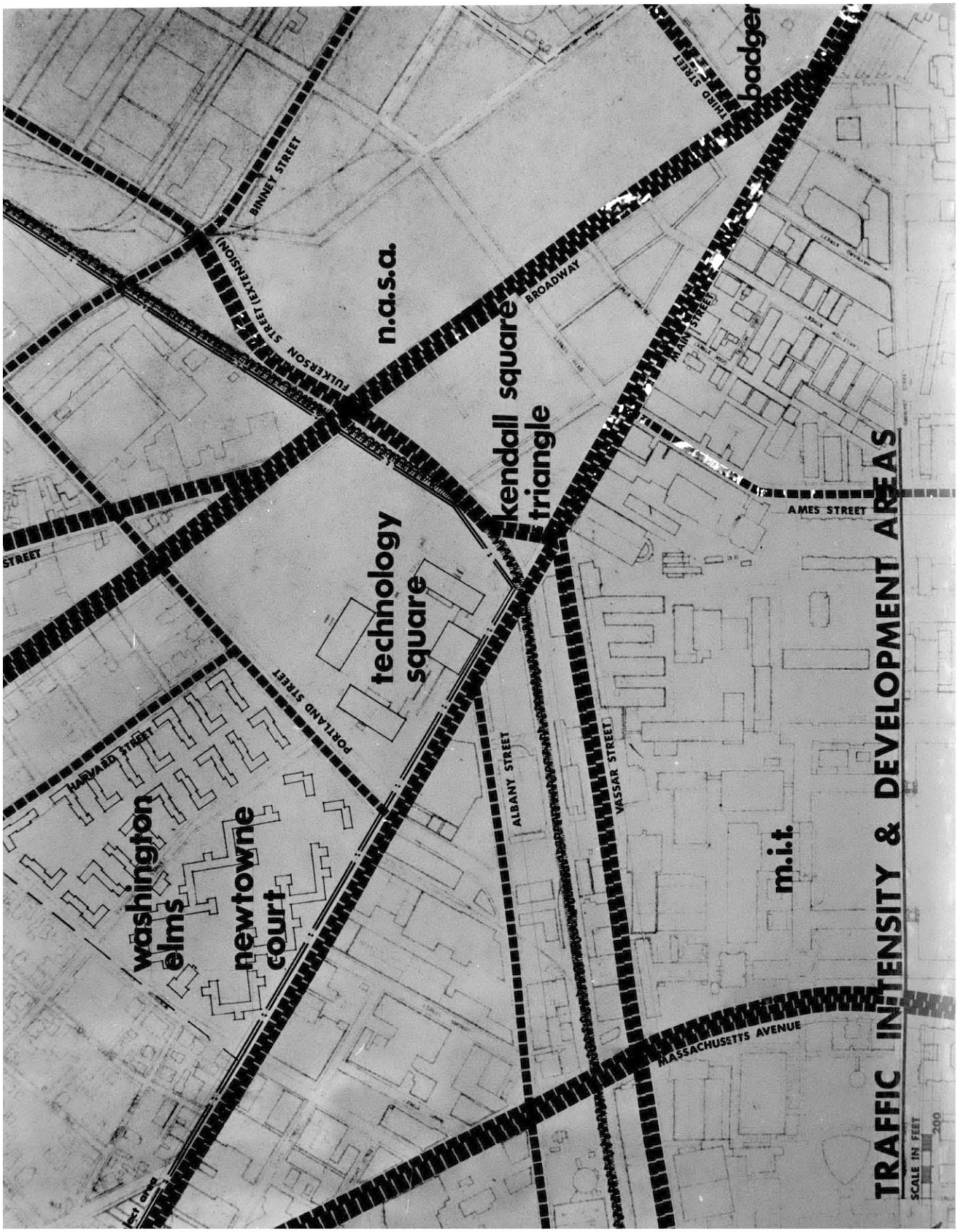
Urban change and growth is certain. Why not have planning policies which model the realities of dynamic urban use and form?

figure 1


CAMBRIDGE
SOMERVILLE
CHELSEA
BOSTON
LOGAN INTERNATIONAL AIRPORT
Governors Island
Orient Heights
East Boston
South Boston
City Point
URBAN RELATIONSHIPS
BOSTON
SCALE IN FEET
2000
N

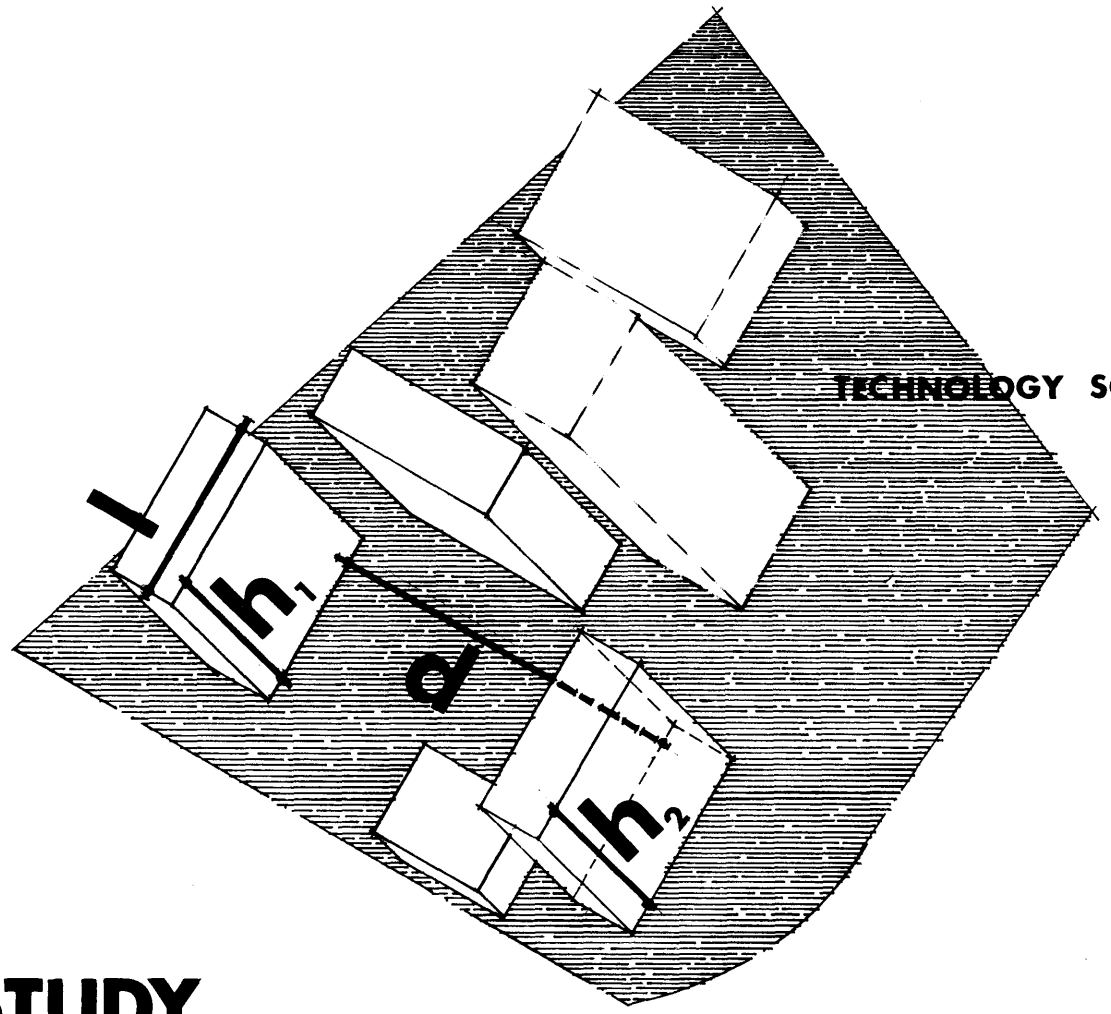
Toward Kendall Square figure 2

figure 3.


n.a.s.a.
kendall square triangle
technology square
washington elms
newtowne court
m.i.t.
BINNEY STREET
FULKERSON STREET (EXTENSION)
BROADWAY
MAIN STREET
THIRD STREET
badger
AMES STREET
PORTLAND STREET
HARVARD STREET
ALBANY STREET
VASSAR STREET
MASSACHUSETTS AVENUE
TRAFFIC INTENSITY & DEVELOPMENT AREAS
SCALE IN FEET
200

CRITICAL REQUIREMENT (Article V, Section I, Cambridge Zoning Ordinance)

Distance (d) between separate buildings = $h_1 + h_2 + \frac{l_1}{6}$



ZONING STUDY

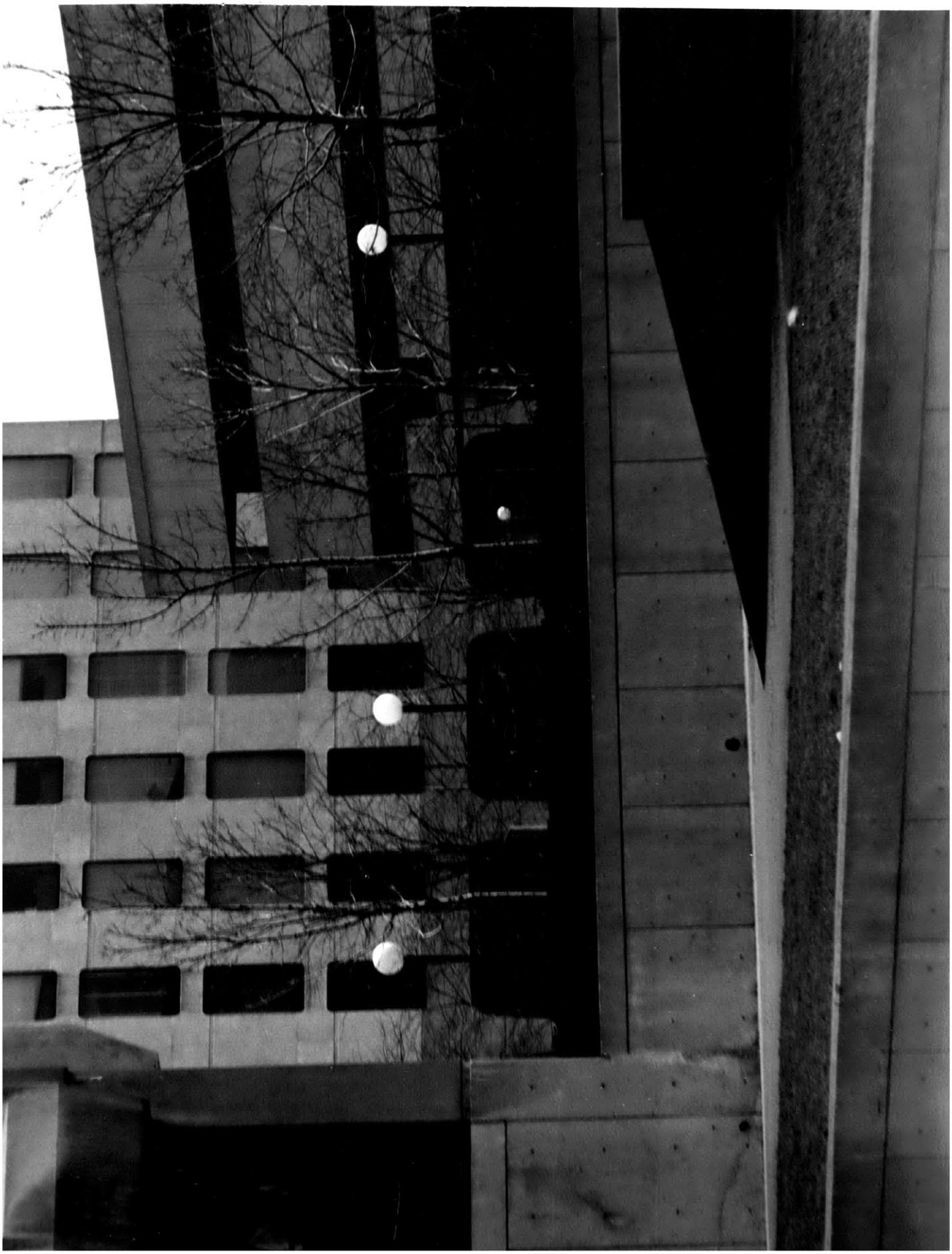
SCALE IN FEET

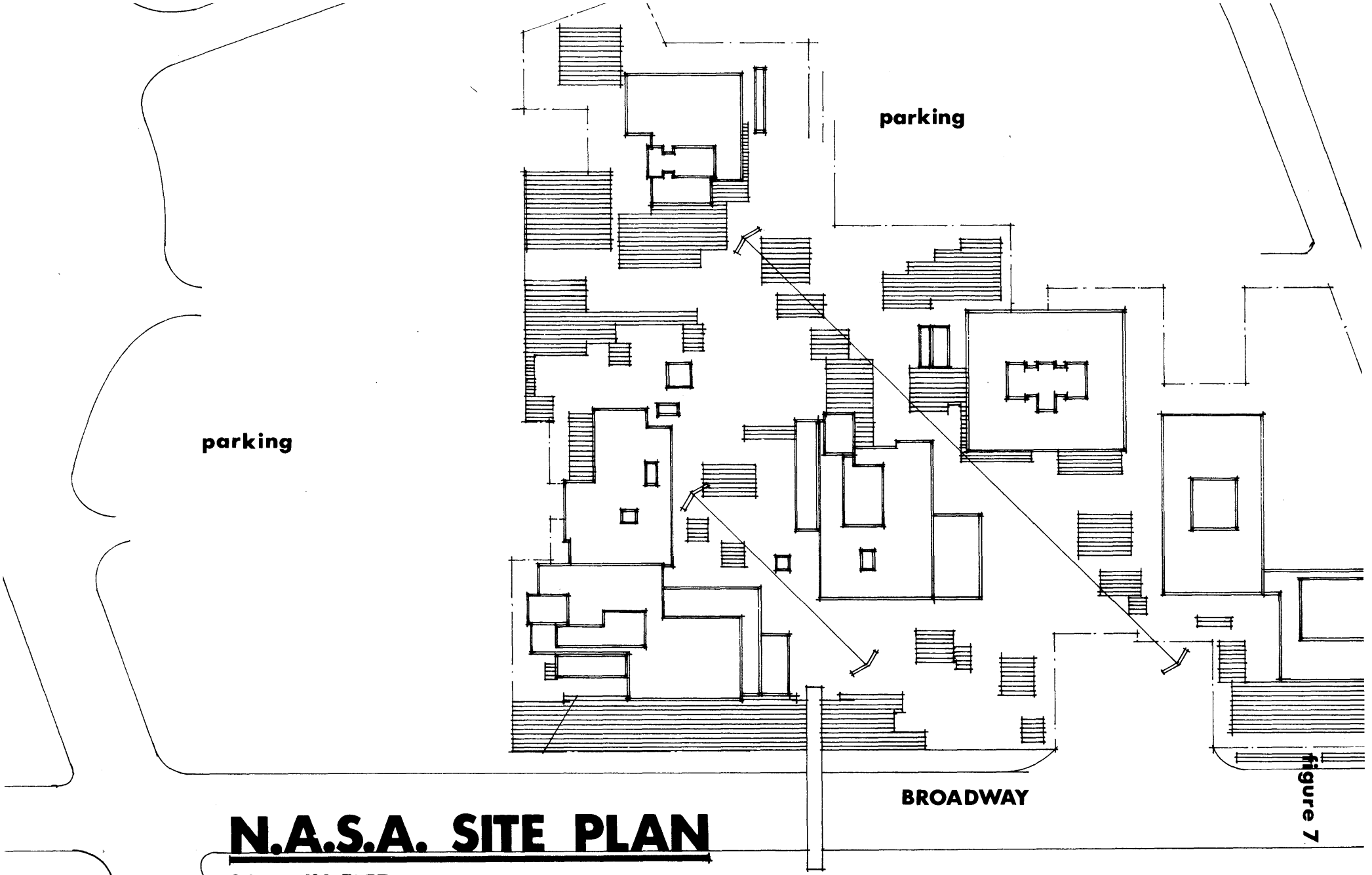
200

figure 4

Portland and Main figure 5

Technology Square figure 6





N.A.S.A. SITE PLAN

SCALE IN FEET

100

figure 7

figure 8

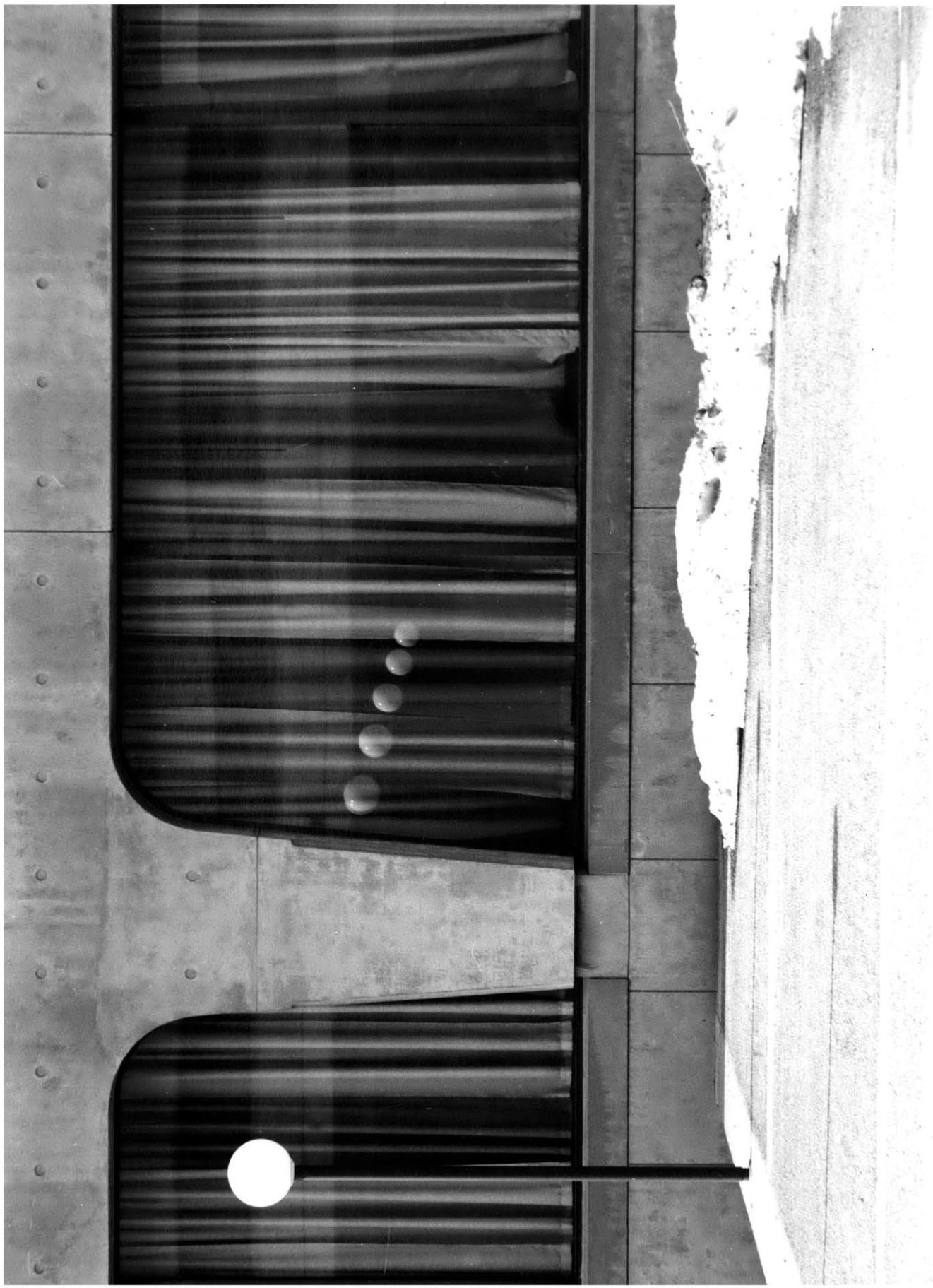


figure 9

figure 10

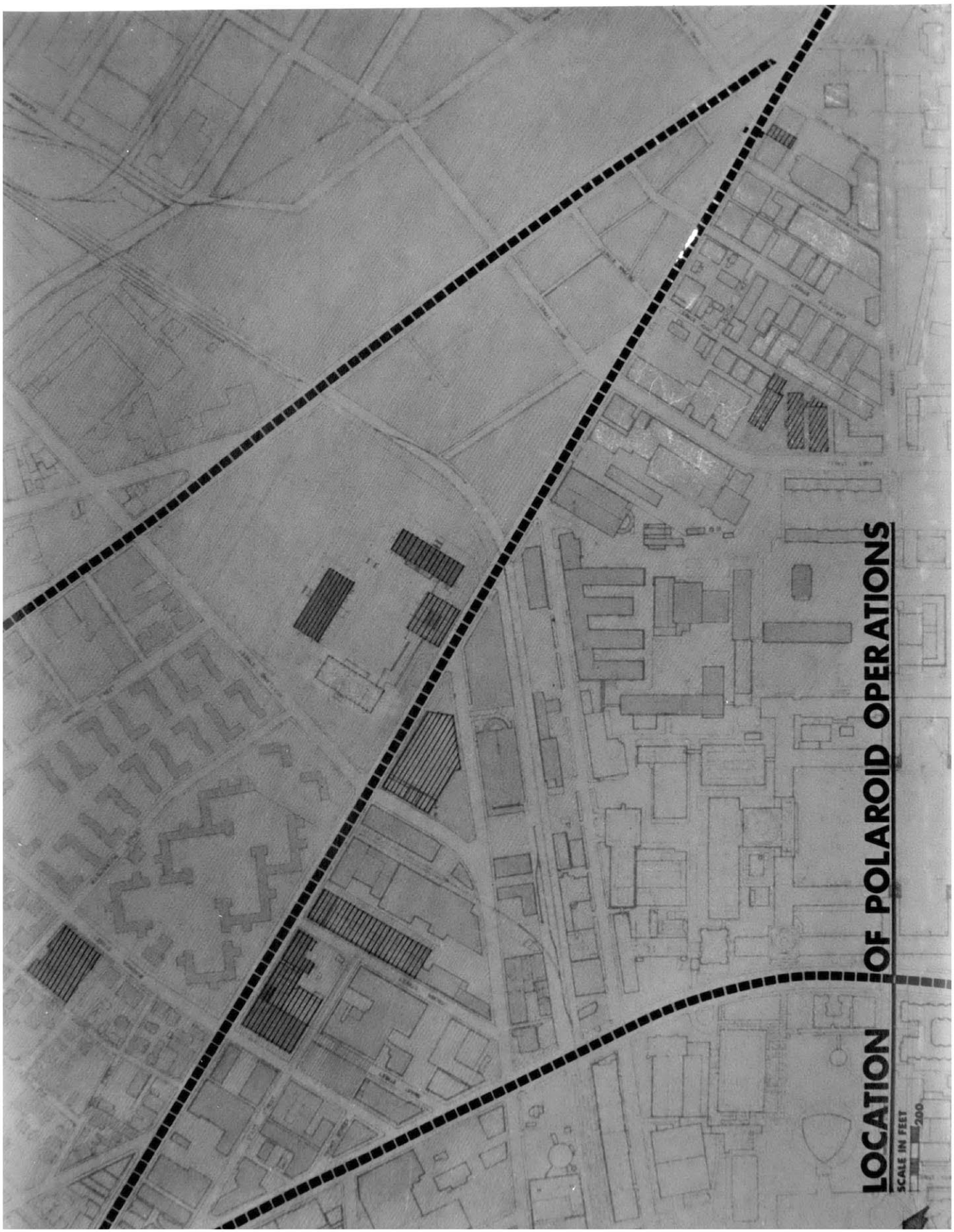
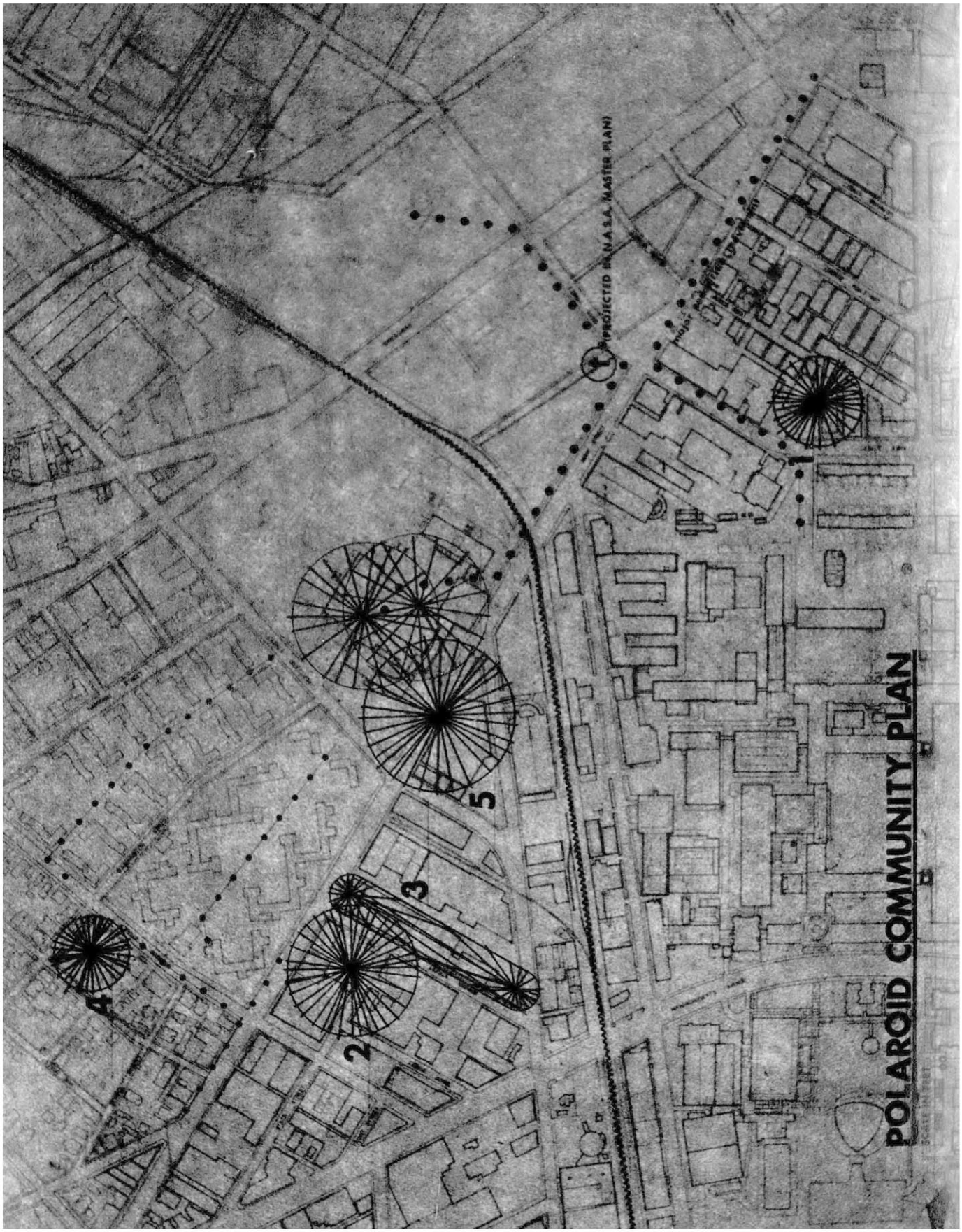


figure 11


PROJECTED BY N.A.S.A. MASTER PLAN
1
2
3
4
5
POLAROID COMMUNITY PLAN

Toward Government Center. figure 12

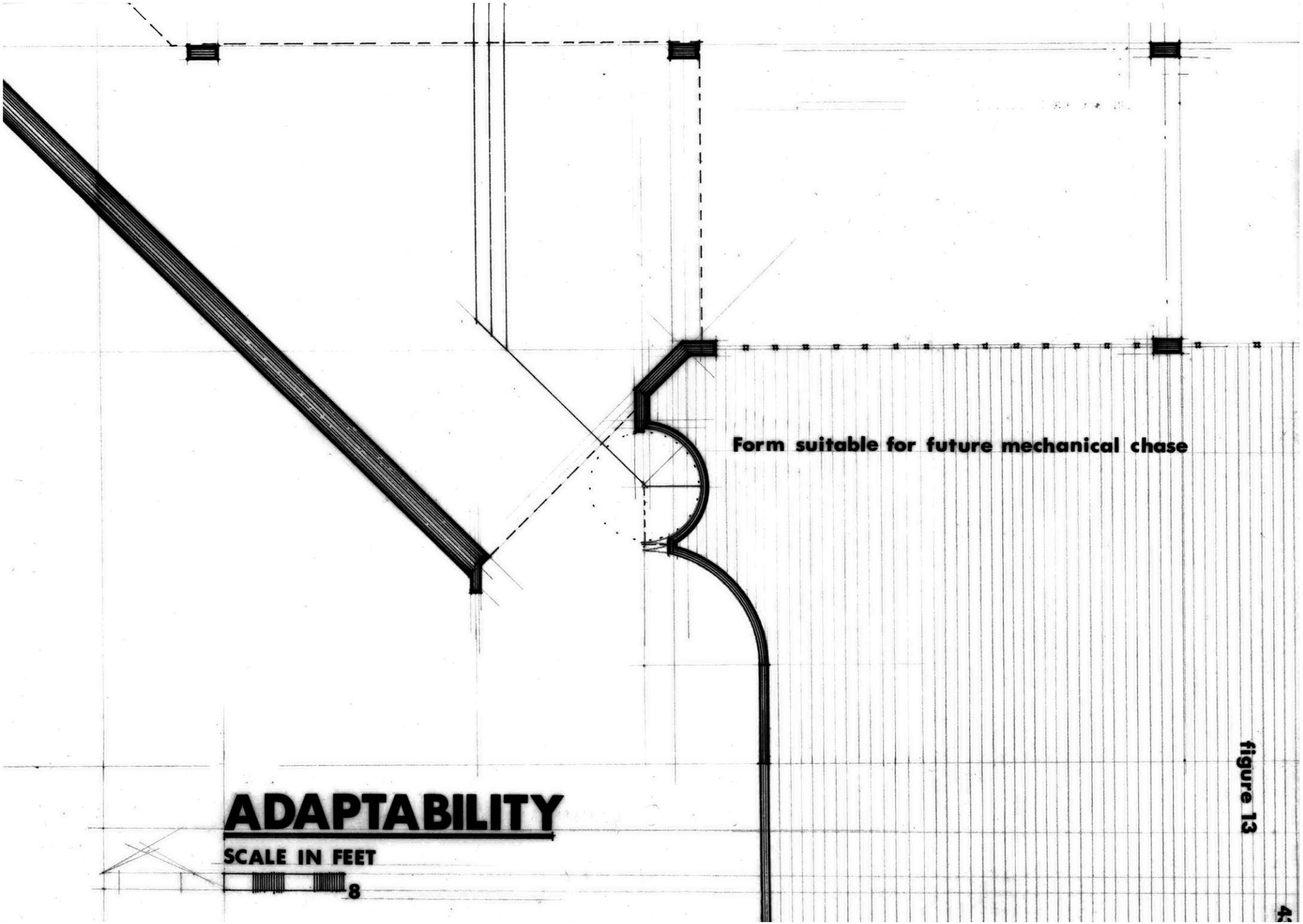

Form suitable for future mechanical chase
ADAPTABILITY
SCALE IN FEET
8

figure 13

figure 14

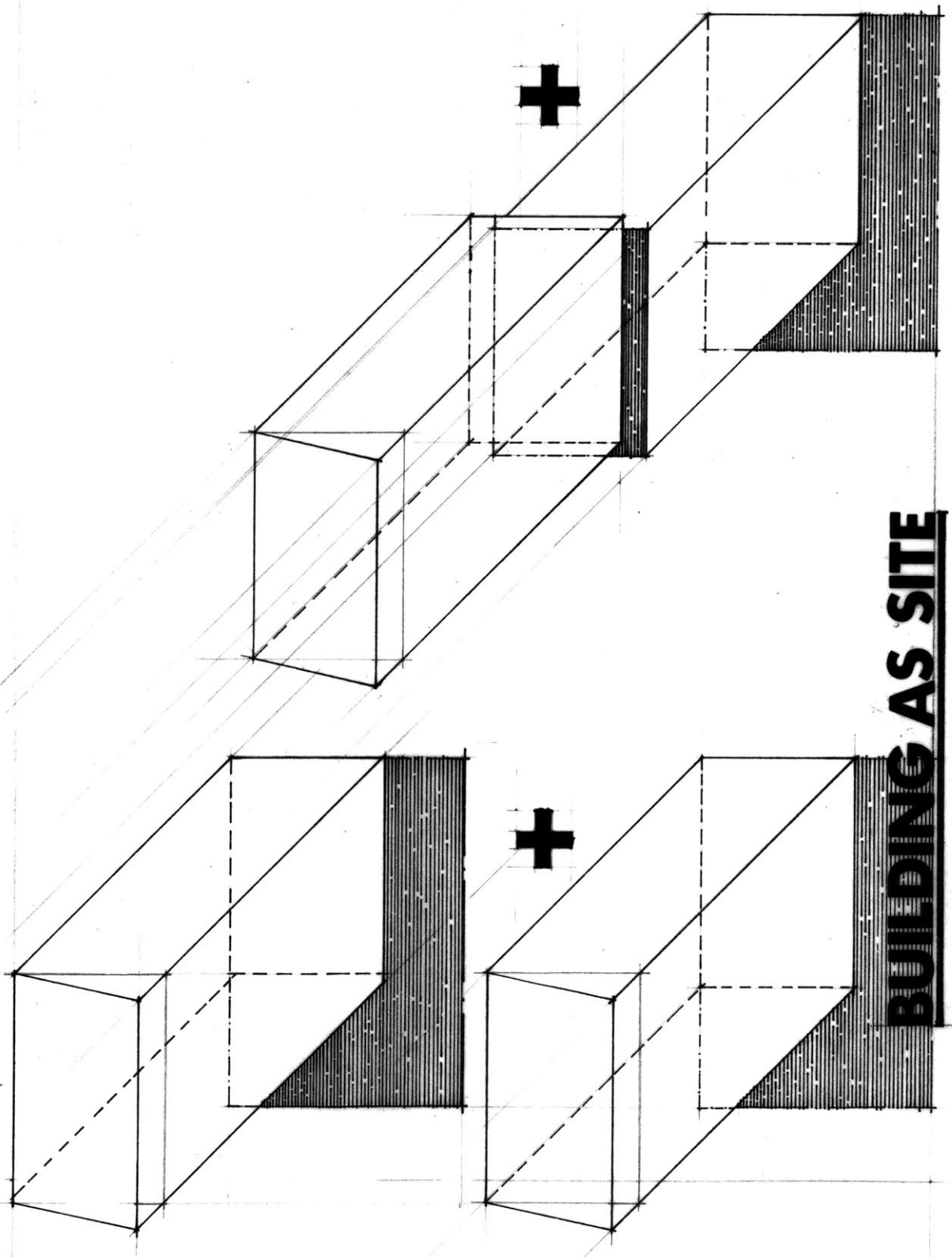


figure 15

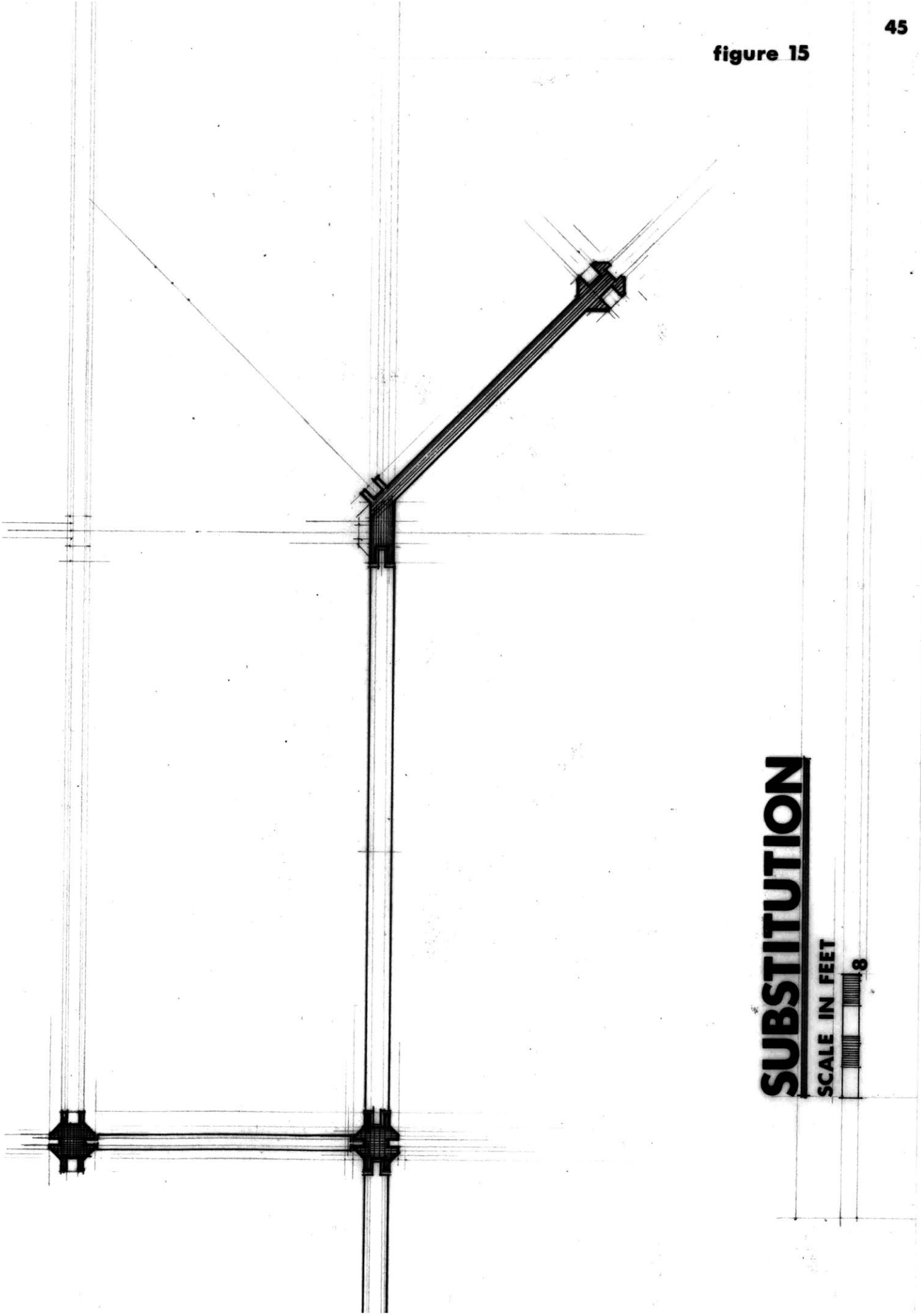


figure 16

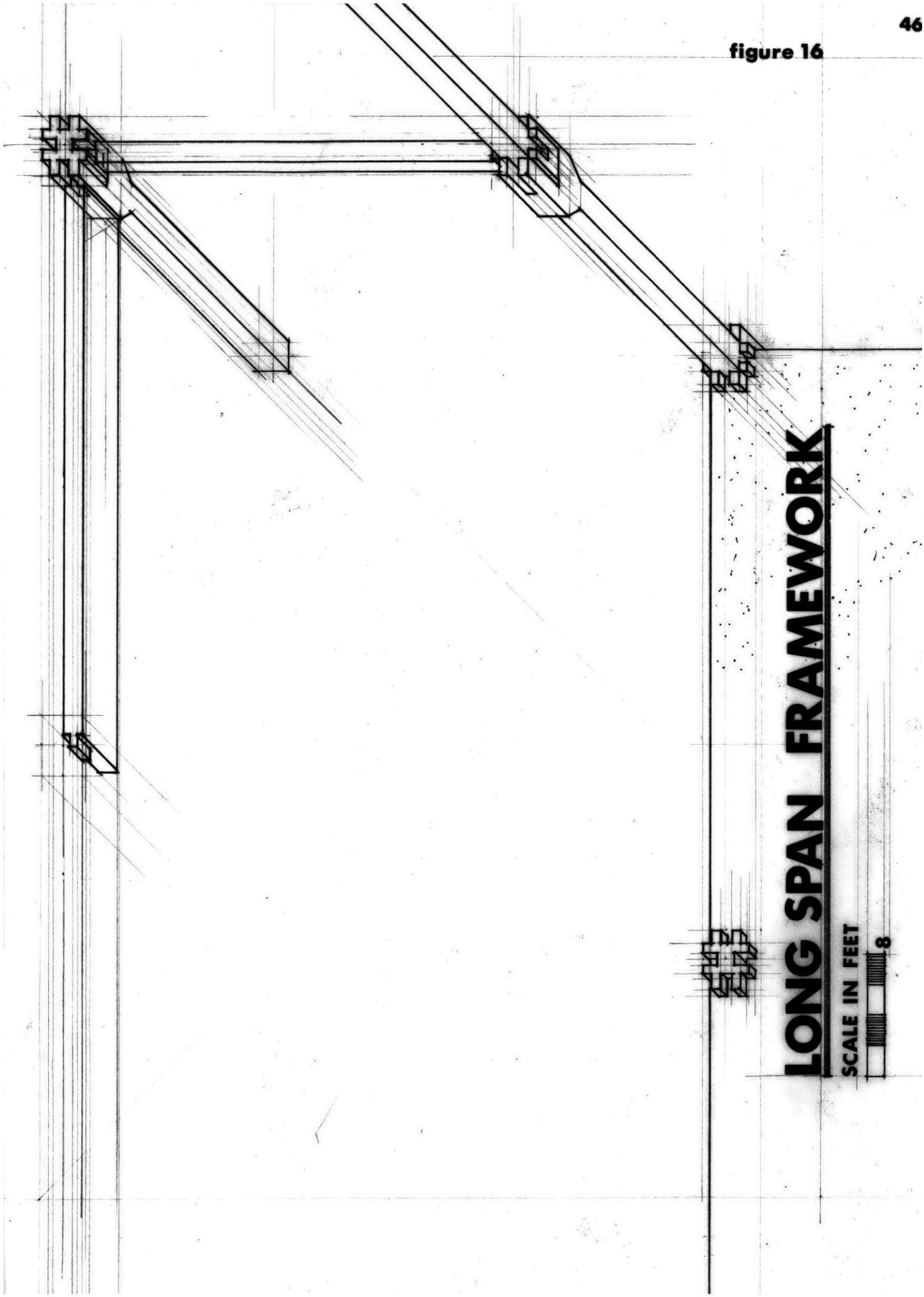
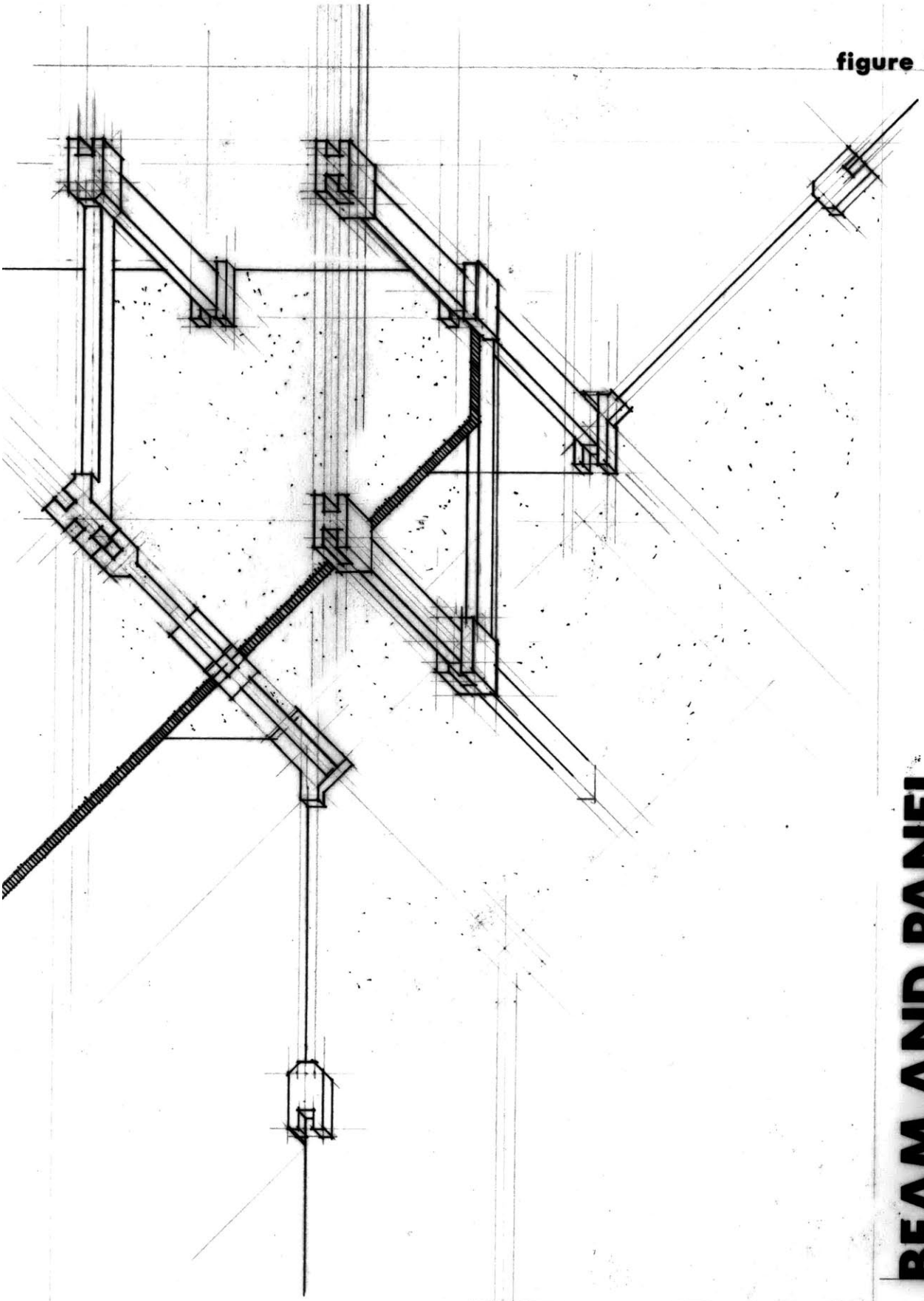


figure 17

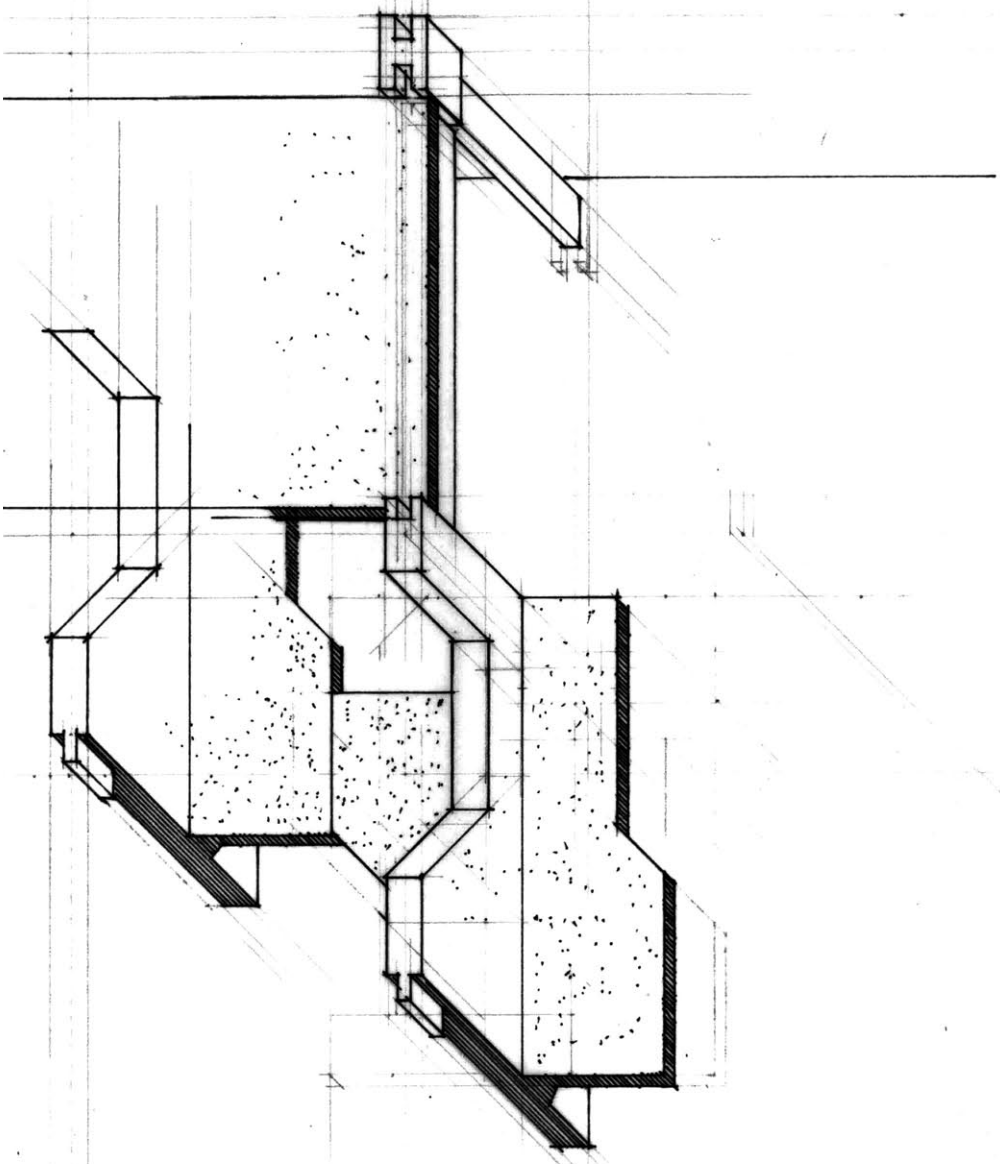


BEAM AND PANEL

SCALE IN FEET

8

figure 18



PLANAR

SCALE IN FEET 8

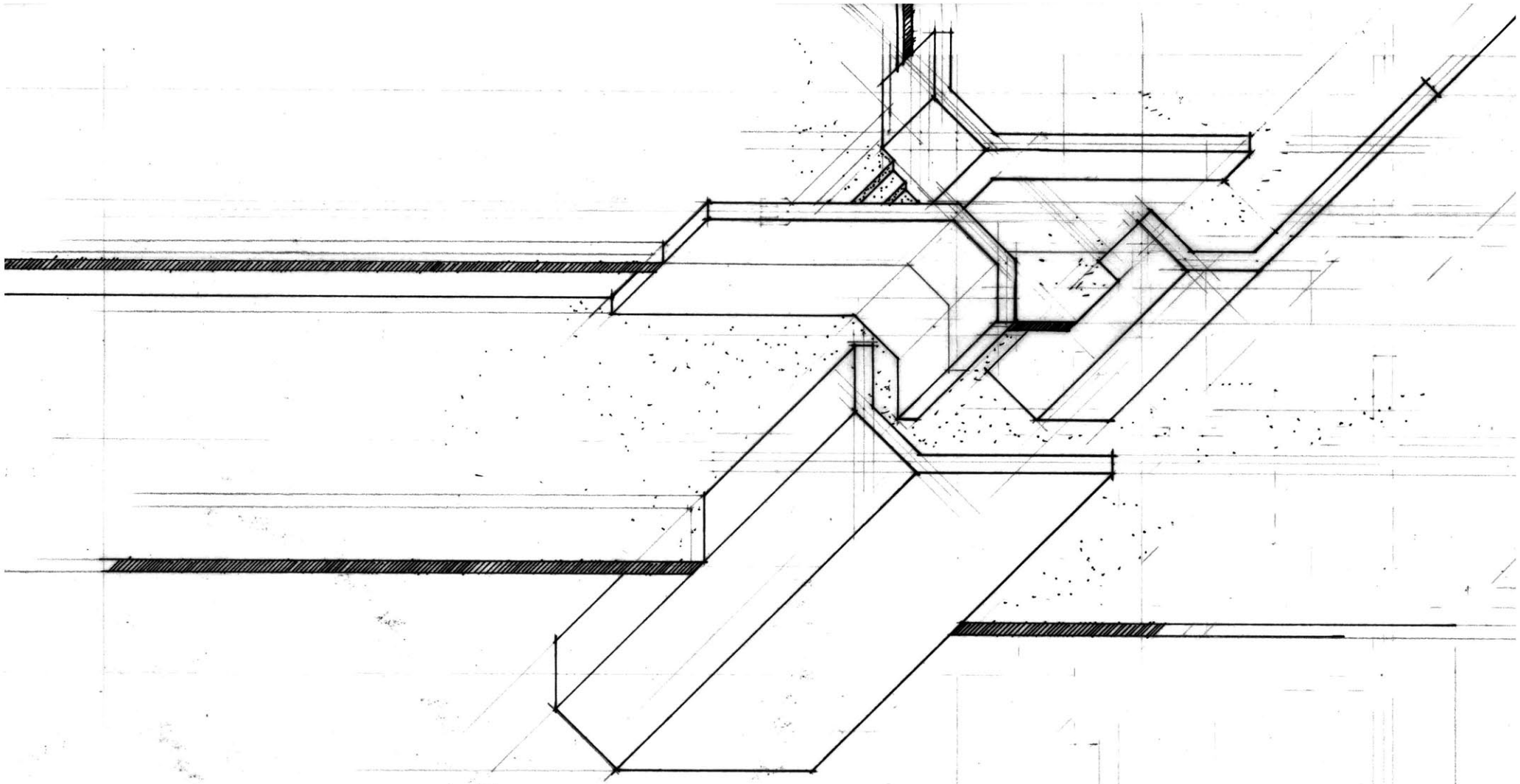


figure 19

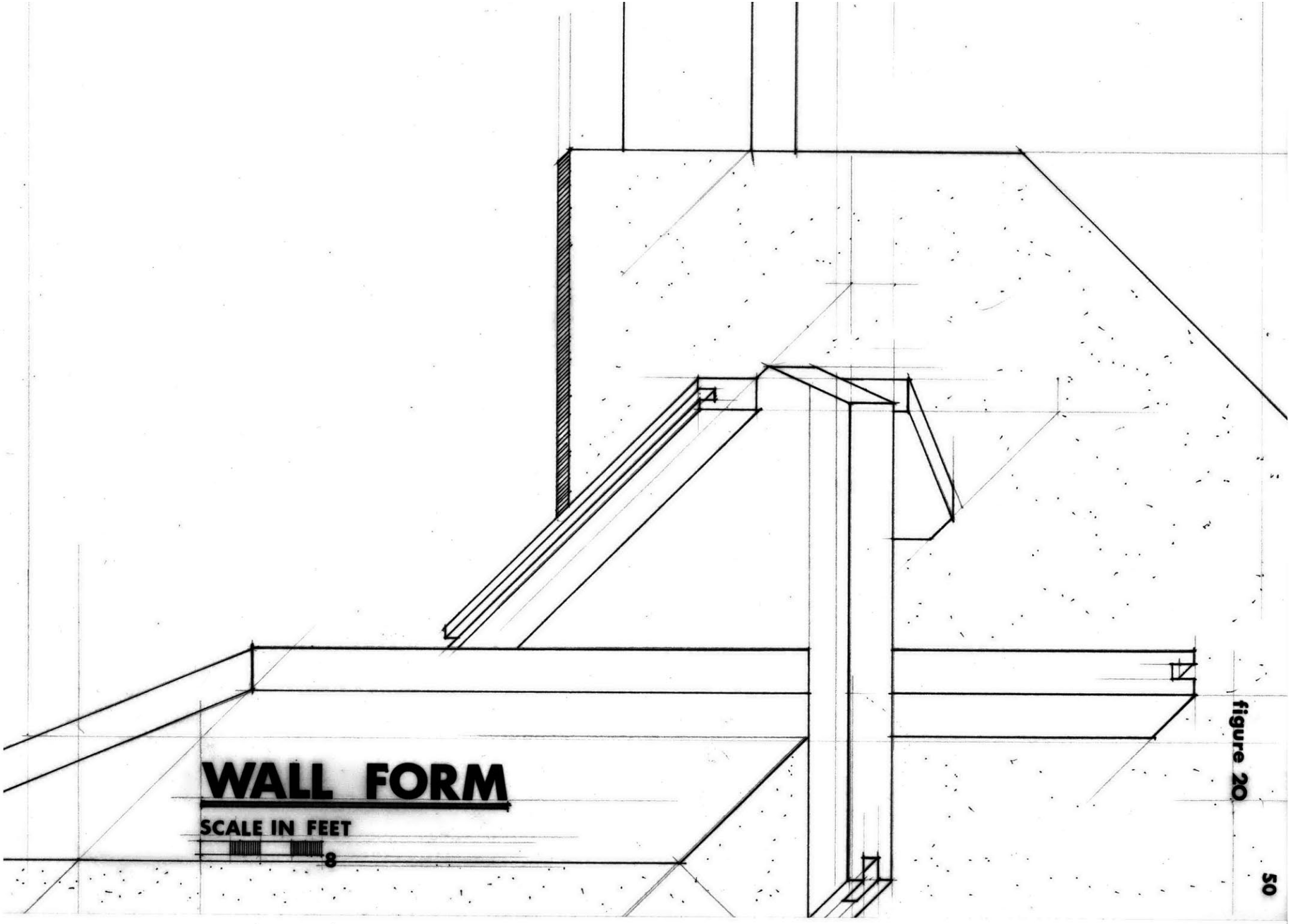


figure 20

LAND USES

- residential
- commercial
- institutional / office
- industrial

CURRENT LAND-USE UPPER

SCALE IN FEET

100

figure 21

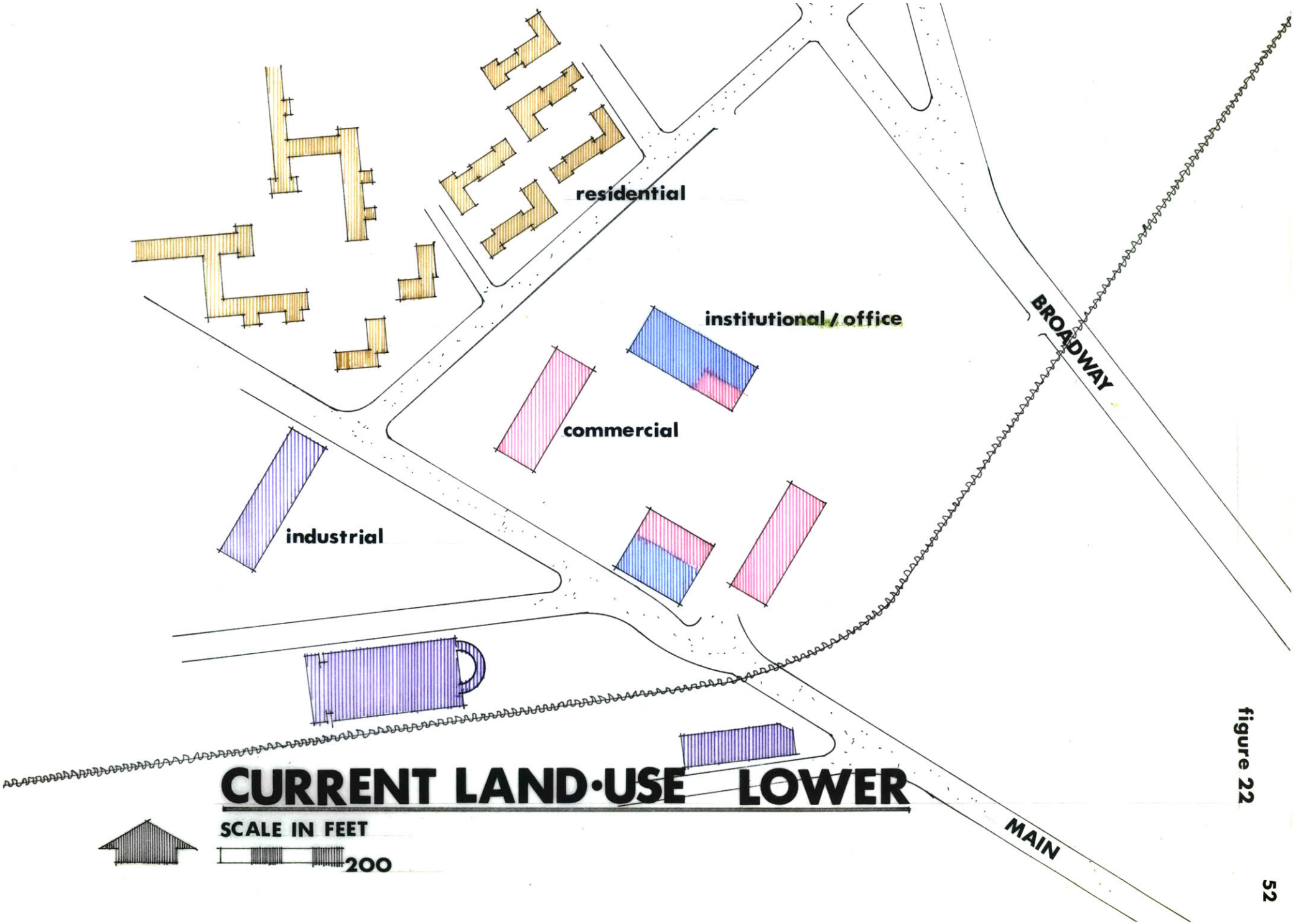
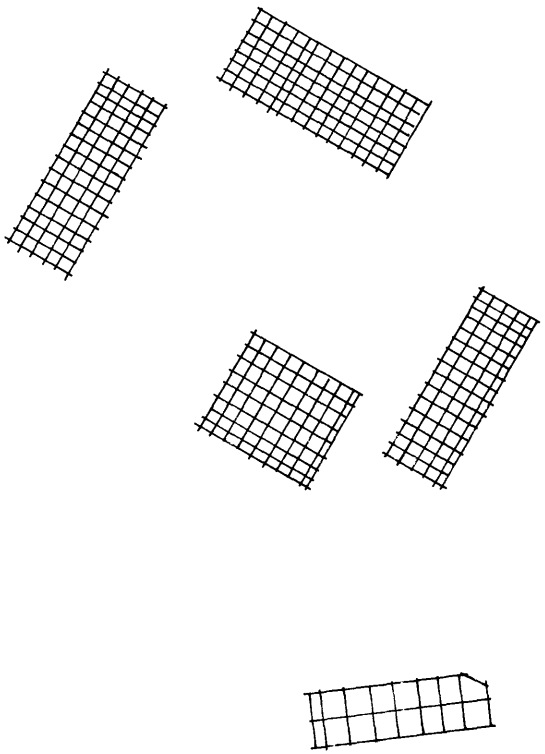

residential
institutional / office
commercial
industrial
BROADWAY
MAIN
CURRENT LAND·USE LOWER
SCALE IN FEET
200

figure 22

TEXTURE OF SPATIAL AND BUILT FORM

close grain
medium grain
open grain



TEXTURE UPPER

SCALE IN FEET
200

figure 23

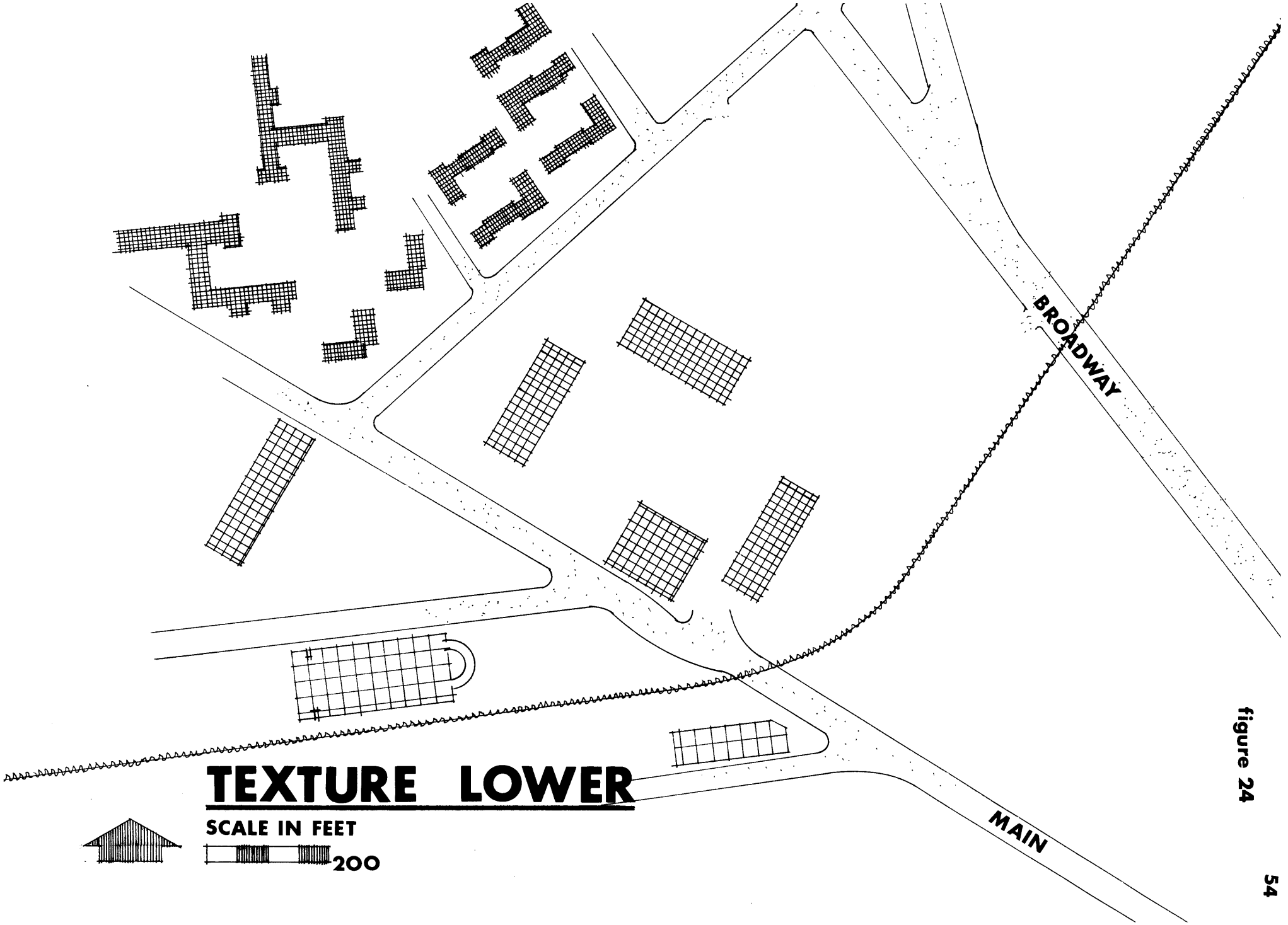


figure 24

ADDITIONS U

SCALE IN FEET

200

figure25

figure 26

figure 27.

figure 28

figure 29

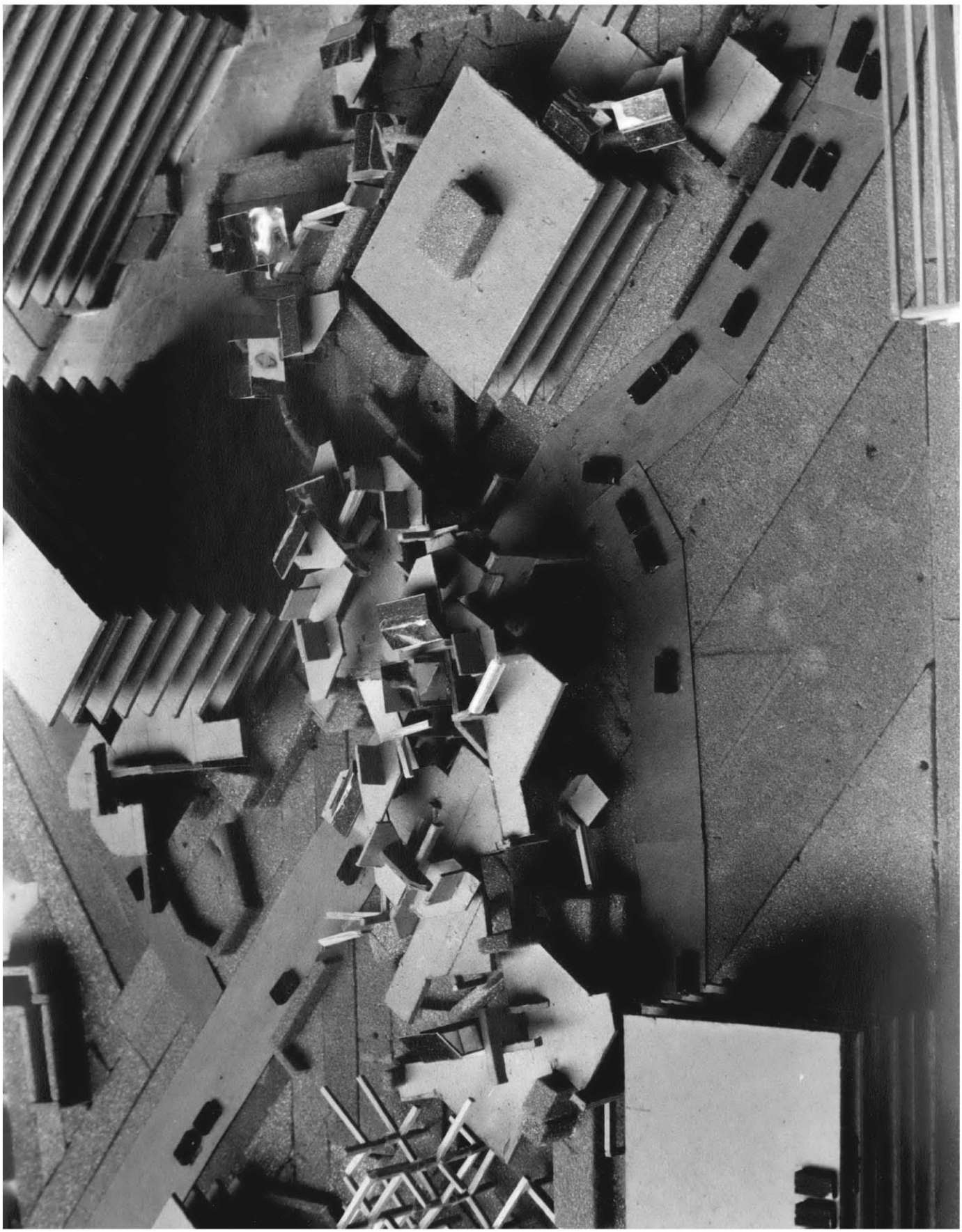


figure 30

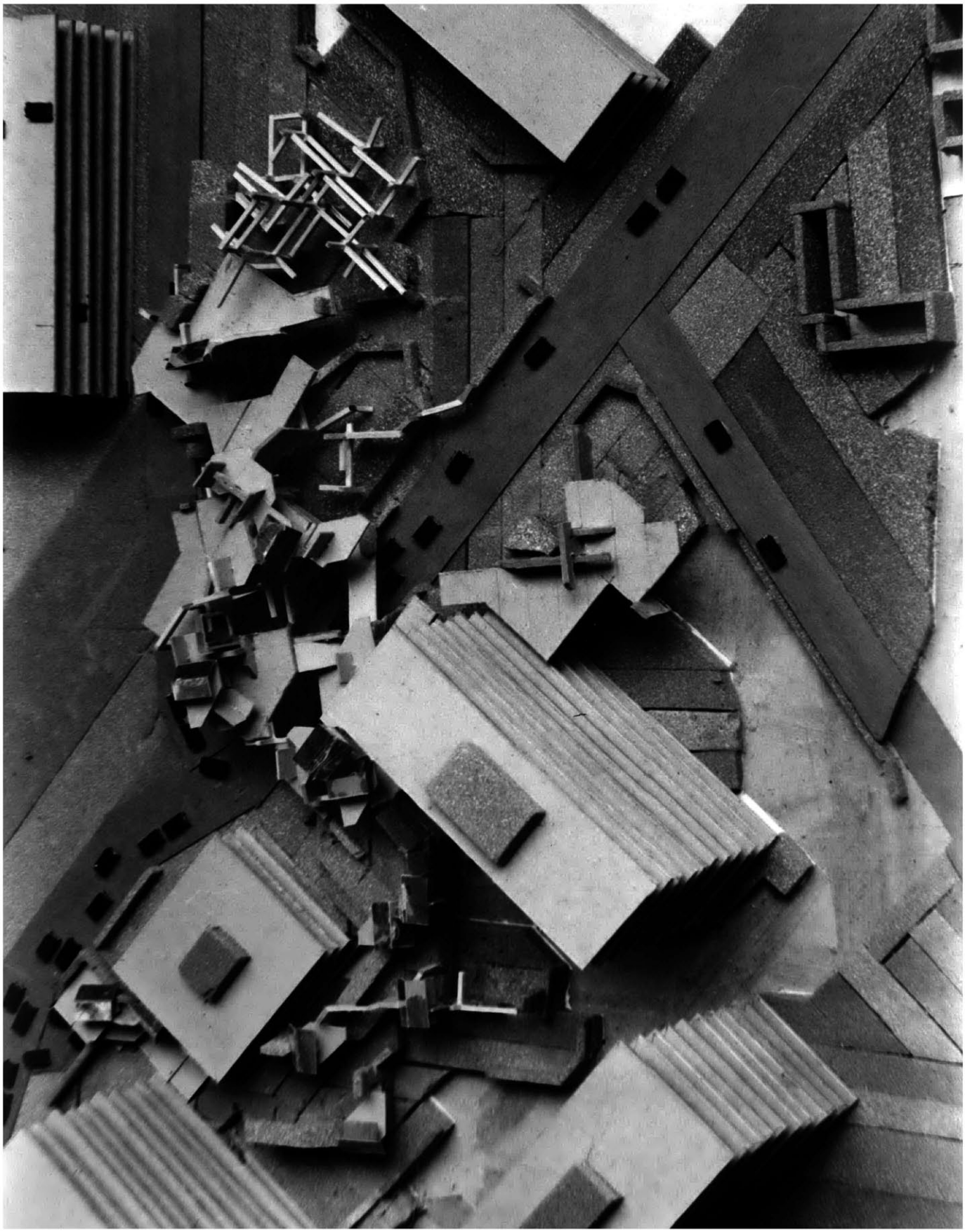


figure 31

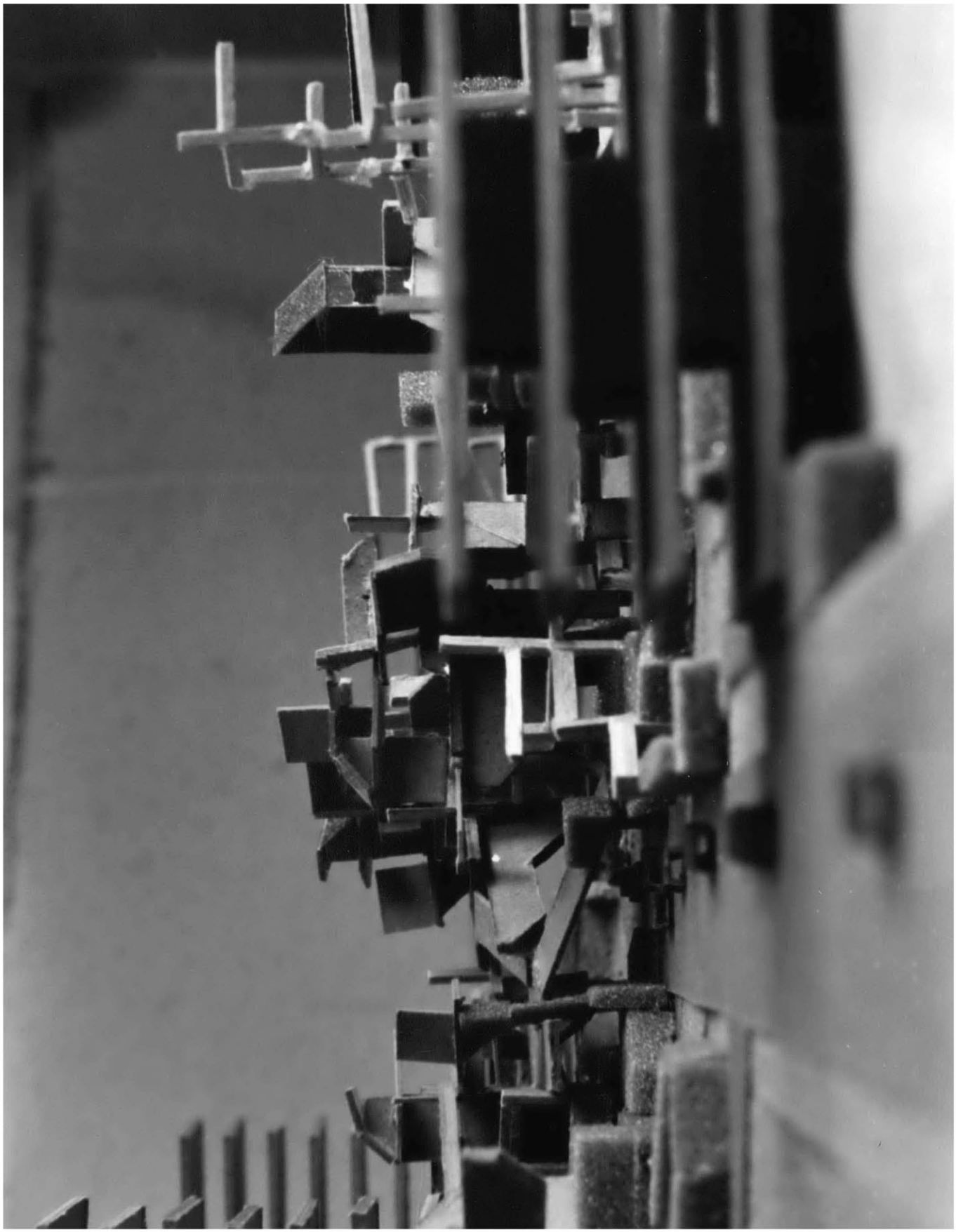
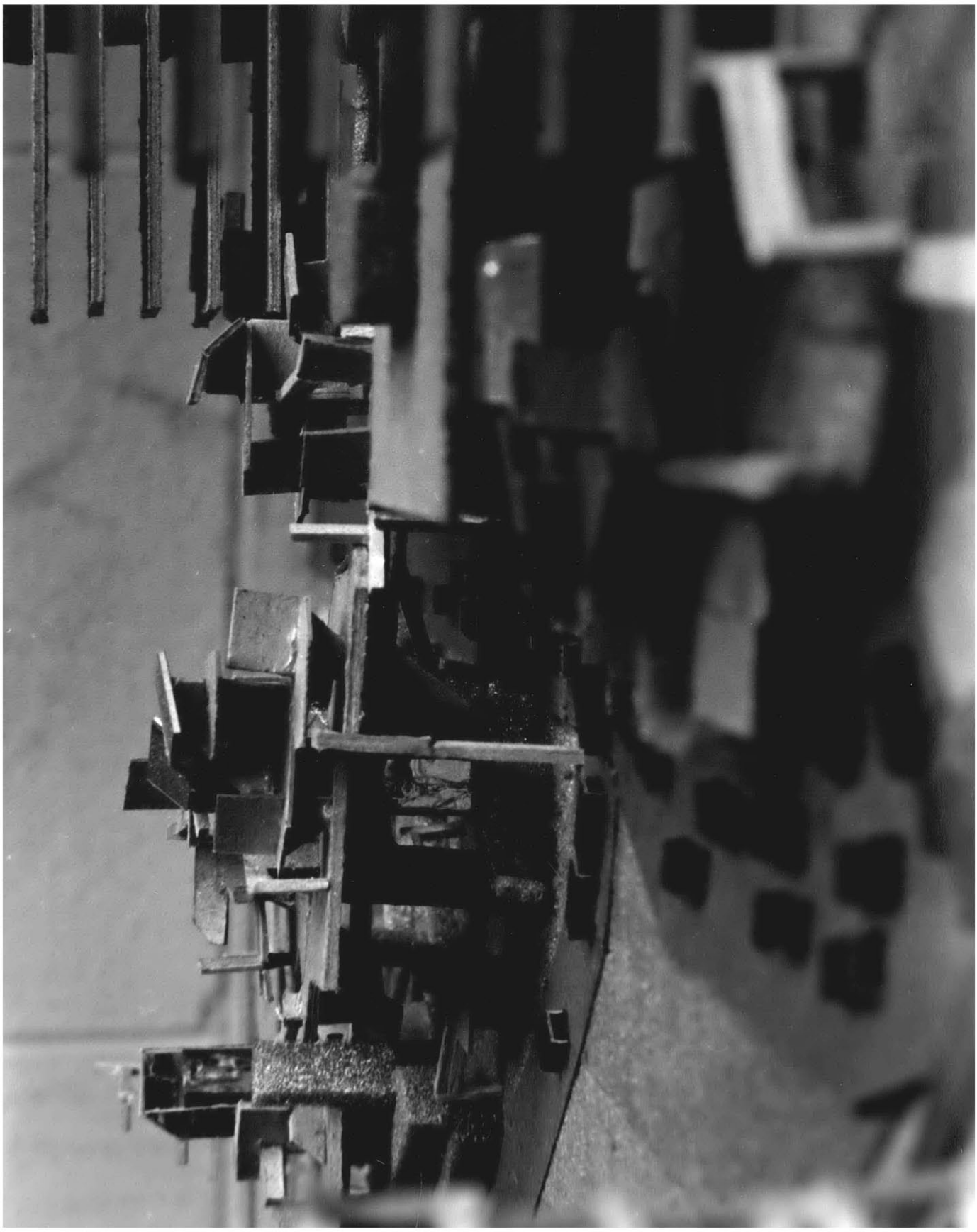


figure 32

figure 33



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